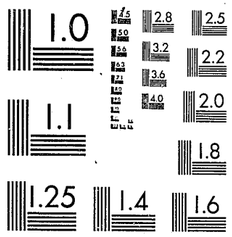

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U.S. Department of Justice
National Institute of Justice

The Link Between Crime and the Built Environment

The Current State of Knowledge

Volume I

a publication of the National Institute of Justice

National Institute of Justice
Harry M. Bratt
Acting Director

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The Link Between Crime and the Built Environment

The Current State of Knowledge

Volume I

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December 1980

U.S. Department of Justice
National Institute of Justice

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Introduction

INTRODUCTION

In 1972, Oscar Newman published a book called *Defensible Space*. Its message was that the the physical characteristics of the environment can prevent crime--not just by building fortresses, but also by affecting people's perception of their security from intrusion and their freedom of action to protect themselves and their neighbors. At a time when crime rates were rising steeply and the textbook solutions were too expensive, too long-term, or too uncertain, Newman's thesis was an attention-getter. Architects and urban planners as well as social scientists and criminal justice practitioners began looking to architectural design as a means of stemming the growing problem of urban crime. "Defensible space" entered the language of program planners.

The defensible space concept drew from a body of work that had begun in the early 1960s, with Jane Jacobs' *Death and Life of Great American Cities* (1961). C. Ray Jeffery (1971) gave it a theoretical context. The new literature in the early 1970s expanded the scope of the hypotheses, put them in the context of specific housing projects and specific measures, and provoked a decade of subsequent efforts, mostly sponsored by the Federal Government. The Law Enforcement Assistance Administration (LEAA), the National Science Foundation (NSF), the Department of Housing and Urban Development (HUD), along with a scattering of local agencies and universities, have supported and are continuing to support both demonstration and research activities to expand the empirically based knowledge of the link between crime and the built environment.

The purpose of this study is to assess the state of knowledge on the link between crime and the built environment (C/BE) as of the end of the 1970s. As such, the study is a snapshot of a changing scene. Several important new research projects are underway; more are planned. They may fill in many of the gaps that we discuss, and clarify many of the existing ambiguities in the evidence. What follows is an interim report on where matters stand now, on a topic that is still in an exploratory phase. In this study, we focus on two topics:

- What has been established about the C/BE link?
- What are the key outstanding issues?

The answers are based on what we believe to have been an exhaustive review, short of secondary analysis, of all empirical studies on the topic conducted during the last decade. The individual assessments are separately bound, in Volume Two.* In this volume, we synthesize the results. Section I discusses the design of the study. Section II lays out the logic linking the built environment and crime. Section III summarizes the state of empirical knowledge on the specific aspects of the logic of C/BE link. Section IV draws together the findings.

Appendix A describes the literature review strategy and presents the bibliography used for the study.

* Volume Two is available on loan from the National Criminal Justice Reference Service, Box 6000, Rockville, Maryland 20850.

Section I:

The Domain of the Study

SECTION I
THE DOMAIN OF THE STUDY

Every study that we included in this review met the following three criteria:

The study had some sort of empirical base, either for testing or for developing the argument.

In one form or another, *the study used the built environment as the independent variable.* This could include a broad range of settings--individual housing designs; design of residential communities and street layouts; design of schools and school grounds; public housing and surrounding grounds; other residential and commercial buildings; and specific characteristics such as street lighting, landscaping, and security devices. The study need not have been limited to strategies that manipulated the built environment, but it must have included some of them.

The dependent variable included occurrence of stranger-to-stranger crimes or the fear of crime in a given area.

In applying these criteria, we deliberately put bounds on the domain. First, we did not review the literature on physical environments that have idiosyncratic characteristics and overriding security needs. Studies of prison facilities, mental institutions, armed forces bases, nuclear test sites, banks and heavily secured office buildings were excluded because of their unique security needs. Second, we did not review the literature on categories such as white-

collar crime, organized crime, gang-oriented crime, or technologically sophisticated crime such as computer theft. Further, we did not include a study if it focused only on crime among relatives or other acquaintances. We excluded studies of techniques necessary to defeat a particular type of lock, window, door, or alarm system in a controlled setting.

The research that we did review includes evaluations of recent government programs, survey research, comparisons of crime levels across settings with distinguishable physical design characteristics, and other investigations of C/BE links. To compile a complete inventory of these empirical studies, AIR undertook an extensive literature search.

The Literature Review Strategy

AIR gathered both published and unpublished studies for review. The search strategy is explained in detail in Appendix B and summarized here.

Two primary search strategies were employed. AIR used a variety of computer-assisted and manual searches of relevant journals, indices, bibliographies, LEAA-supported studies and evaluations, and conference papers and proceedings. As books, articles, and unpublished papers were collected, each of their bibliographies were searched for further references. All titles that looked promising were collected and, if appropriate, were retained for further review. The second search strategy employed a telephone survey of approximately 130 of the leading researchers and Federal, state, and local officials with experience in this field. (For a complete listing of library and computer-assisted searches, see Appendix B.)

Selection and Classification of Studies for Further Assessment

Preliminary assessments were made of 52 studies. On the basis of these assessments, 15 were identified as sufficiently promising to warrant a thorough assessment, and classified by:

- type of crimes investigated
- type of environments investigated
- rationale or theoretic model upon which the study was based
- hypotheses generated or tested (if any)
- sources of data used
- unit(s) of analysis
- statistical methods employed in analyzing the data base

The Review Procedures

All studies were reviewed independently by three reviewers. Written assessments were prepared. All assessments, preliminary and in-depth, contain the following information:

1. Descriptive Section

   A. Objectives of the Study
   B. Research Design
   C. Listing of Variables
   D. Operational Definitions of Variables
   E. Sampling Procedures
   F. Statistical Methods

2. Evaluation Section

   A. Assessment of the Quality of Operational Definitions
   B. Assessment of the Appropriateness of the Research Design
   C. Assessment of the Appropriateness of the Sampling Procedures Used
   D. Assessments of the Statistical Methods Used

3. Conclusion Section

   A. List of Author's Conclusions
   B. Discussion of Conclusions

No secondary analysis was undertaken unless it could be done solely through the data in the study (primarily, when we could apply log-linear procedures to multidimensional cross-tabulations that had been tested in the original study through two-dimensional chi-square techniques). With this exception, the evaluation section of the reviews focused on what could be gleaned from the study itself. The draft of each review was then submitted to the author(s) of the study. We incorporated the responses into subsequent drafts of the assessment. Residual disagreements are noted. These individual assessments are available in Volume Two.

Section II:

The Logic Linking Crime and the Built Environment

SECTION II.
THE LOGIC LINKING CRIME AND THE BUILT ENVIRONMENT

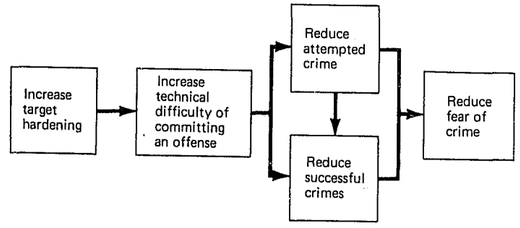
There are many ways to organize the literature on any topic. We chose to organize the studies we reviewed on the basis of how they fit into theory; i.e., how they fit into the "rationales" or "logic models" that connect the built environment and crime. Other schemes are possible. We believe that our approach provides the best gestalt.

We have split the overall rationale for the C/BE link into three main lines. In part, this serves to make understandable what would otherwise be a rat's nest of intertwining hypotheses. In part also, however, the three lines capture distinctive arguments that have been developed. The three lines are labeled the *hardware* rationale, the *social surveillance* rationale, and the *community-building* rationale. We describe each below.

The Hardware Rationale

Under the hardware rationale we include all measures that can succeed solely by means of technology and paid operators. The community at large can be entirely passive. The distinction between this set of strategies and those included under the social surveillance and community-building rationale is that the other rationales are based on hypotheses that the physical characteristics affect social relationships which then, in turn, affect levels of crime and fear of crime. The hardware rationale assumes that no social variable need enter the equation before a relationship with crime or fear of crime levels can be expected.

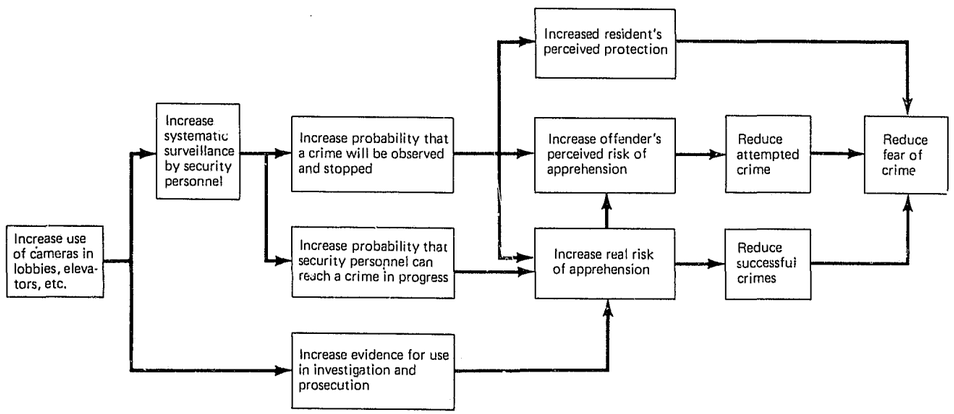
The most familiar hardware measures involve *target-hardening*. The notion that a better barrier or lock will lead to a safer house, store, or apartment has guided security-minded persons for centuries. The moats surrounding castles, the walls surrounding cities, and the vaults in our banks attest to the faith that people have in target-hardening. At these extremes, target-hardening is designed to make physical intrusion into an area impossible. In reality, even with triple locks, bars on the windows, and fencing, almost any target can be penetrated. Hardening measures increase the technical difficulty of successfully committing a crime. The expected result is that the potential offender will either forego an offense he might otherwise have attempted (if the unit were not hardened) or fail in defeating the lock or "getting past" the target-hardening device while attempting to commit a crime. In either case the rationale, as diagrammed below, is that successful crimes will be reduced by target-hardening measures and that this reduction in crime will, in turn, lead to a reduction in the fear of crime. In addition, it is plausible that people will have reduced fear of crime just by knowing that the hardware is in place.



A second type of hardware solution involves external *monitoring* by locating cameras and security personnel "observation" stations in lobbies, elevators, and other parts of residential, commercial, school, or other types of buildings. The increased systematic surveillance increases the probability

that a crime (or suspicious behavior prior to a crime) will be observed, and increases the probability that security personnel will be able to respond to a crime in progress. In addition, such devices often are able to increase the available evidence (e.g., photographs, etc.) for use in the investigation and prosecution of the offender. It is assumed that an increase in the likelihood that a crime will be observed will increase the residents' or users' perceived protection and reduce their fear of crime.

Monitoring equipment is further expected to increase the offender's *real* risk of apprehension which, in turn, should increase the offender's perceived risk of apprehension. Perceived risk may also rise simply because the equipment is known to be in place. Increasing the perceived risk to offenders is expected to reduce the number of attempted crimes, while increasing the real risk of apprehension is expected to reduce the number of successful crimes. This reduction of attempted and successful crimes is expected to contribute to a reduction in fear of crime levels. The overall rationale is diagramed below:



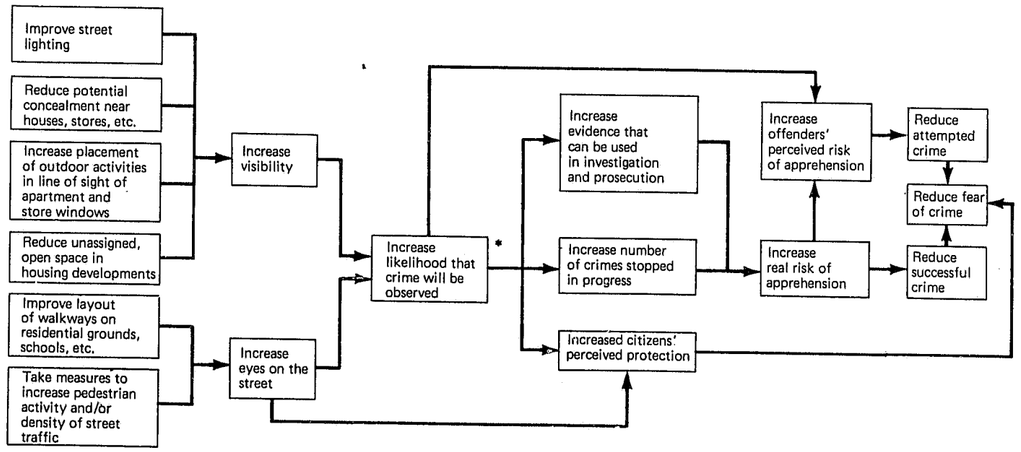
The Social Surveillance Rationale

A second rationale that recurs in the literature will be called the *social surveillance* rationale. It is hypothesized that the design of the physical environment can help residents and users detect suspicious behavior or actual crimes. Given a constant level of willingness of residents and users to respond to a criminal incident, the number of reported crimes should increase as the opportunity to observe is expanded. The willingness of the individual observer to report crimes is a key assumption. Actions that increase surveillance can be effective without *necessarily* affecting the social relationships of the residents or users of an area.

The social surveillance rationale does not encompass only physical design characteristics that lead people to be able to see what is happening to others (e.g., street lighting). It also encompasses strategies that allow an individual to observe more adequately his own property and the surrounding area. "Social," as used here, does not necessarily refer to a response of one person to another's situation; rather, it is used to designate spontaneous social behavior, as distinct from the reactions of a paid surveillant (e.g., security guard).

Physical design changes such as improving street lighting, reducing potential concealment areas near houses or stores, and increasing the number of pedestrians or density of street traffic all contribute directly to the "eyes on the street" notion that is at the heart of the social surveillance rationale. Another strategy for making activities more visible to the resident or user is to move the location of that activity into an area in the plain view of residents. Examples of this strategy include placing outdoor activities (e.g. physical education in school or recreation for youth in a large residential unit) in line of sight of apartment or store windows, pedestrians, users and casual observers.

The literature suggests that increasing visibility sets in motion a series of intermediate effects that eventually lead to reductions in crime and the fear of crime. As shown in the diagram, many of the intermediate effects are the same as those expected to result from target-hardening. For example, increasing visibility is expected to increase the likelihood that a crime will be observed. The potential consequences of this include an increase in the number of crimes stopped in progress, an increase in citizens' perceived protection, and an increase in evidence available for investigation and prosecution. As shown in the diagram below, one link in the theory suggests that environmental design approaches may have an effect on the level of information received by the police. The arrows also bypass this box, indicating the more direct (and more plausible) ways that observation of crime can have an impact on crimes and fear of crime.



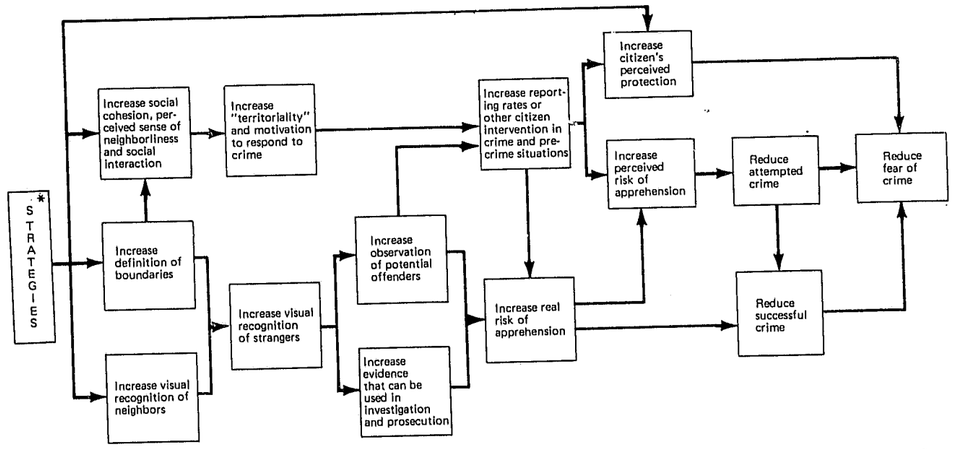
* Assumes a constant probability of intervention for an observed crime.

The social surveillance rationale assumes that there are individuals who will "look out", notice, and report violations in areas visible to them. The offender recognizes that the level

of surveillance opportunities poses a significant risk to his ability to commit a crime and escape. The offender then is expected to choose targets with relatively few surveillance opportunities and forego attempts on targets with greater surveillance capabilities. Fear of crime is reduced in two ways, as shown in the model. Enhanced surveillance opportunities are expected to increase citizens' perceived protection, which makes them feel safer. In addition, the expected reduction in successful and attempted crime is, itself, expected to lead to a reduction in the fear levels among residents and users.

The Community-Building Rationale

The most complex causal chain that links the built environment, crime, and crime prevention behaviors is based on the hypothesis that physical characteristics affect social interaction and cohesion, which in turn affect crime and fear of crime. The number of potential strategies for triggering this causal chain is large. The diagram below outlines the principal design strategies expected to affect social interaction and cohesion.



* Improved street lighting • Increase use of shared public spaces in housing developments • Reduce number of families per entrance and number of apartments per floor in housing developments • Reduce unassigned, open space in housing developments • Increase use of cul-de-sacs and other restricted street configurations • Reduce height and size of housing developments • Increase distance of stores and houses to street • Reduce incongruities and conflicting uses of land • Increase the level of maintenance and aesthetic appeal of public and semi-public spaces • Create hierarchy of zones from public to private space • Increase use of walkways in open areas • Location of Block (residence, store) in interior of neighborhood rather than on border of neighborhood • Increase use of symbolic barriers (landscaping) in housing developments, school grounds, etc.

In general, these strategies are intended to bring people together in open or public areas, or to guide the movements of persons and the placement of activities, or to restrict the people in a given area to "legitimate" users or residents of the area. These results are expected, in turn, to lead to an increased ability to recognize neighbors and an increase in the residents' sense of community. The literature often refers to the physical design's contributing to a sense of "territoriality," which implies that residents have an increased motivation to protect their environment and respond affirmatively to criminal and suspicious acts by reporting the crime or directly intervening before or during the commission of the crime.

The ability to recognize strangers should also increase the opportunity to identify suspicious behavior and follow the movements of potential offenders. One outcome should be more and better-informed witnesses when the police take their reports at the scene, and when a case comes to trial. Another outcome should be an increased likelihood that residents will report a crime or even directly intervene in the crime or pre-crime situation. The total effect is to raise the real risk of apprehension. Over the long run, this may be hypothesized to raise the perceived risk of apprehension.

Such are the main lines of the arguments, tacit or explicit, that have been employed. They are not intended to capture the nuances of every conceptual approach we encountered, but they do serve as a basic roadmap for breaking out the state of the evidence on the proposition that changes in the built environment can significantly reduce crime.

Section III:

The State of the Evidence

SECTION III
STATE OF THE EVIDENCE

In the following pages, we follow through on the logic of the rationales presented in the preceding section, specifying for each component the state of the evidence as of the end of 1979.

The Evidence for the Hardware Rationale

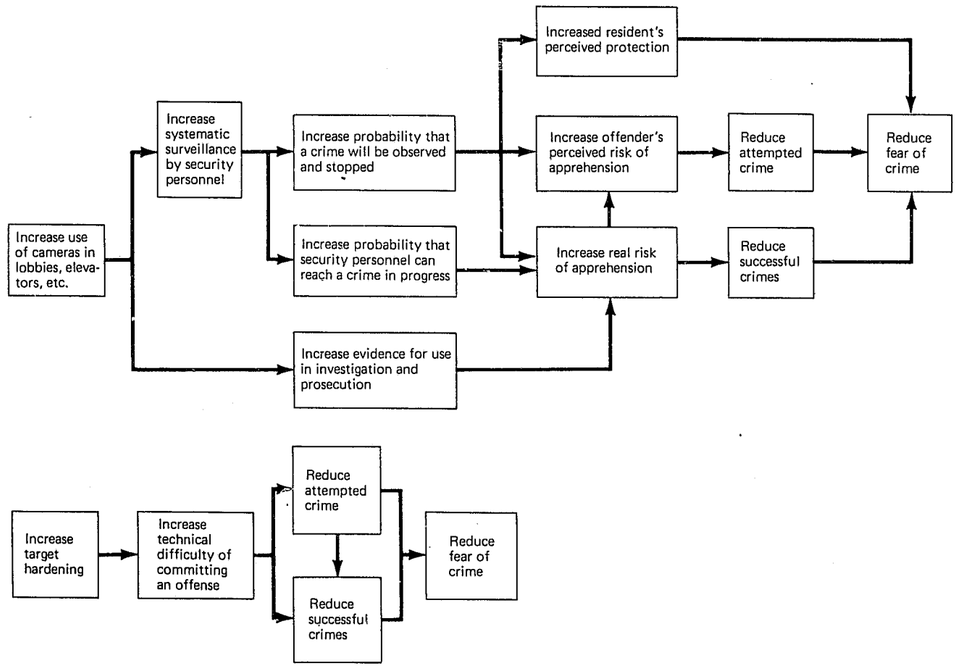


FIGURE 1. The Hardware Rationale

Although the use of hardware strategies is widespread, only a handful of methodologically sound empirical studies have assessed their effects on crime and fear of crime. Many studies evaluate the effect of hardware innovation in combination with social programs, other physical design changes (e.g., changes in walkways), and changes in police patrolling. They are discussed in a later section. The question to which we now turn is whether there is evidence that hardware strategies, by themselves, reduce crime and the fear of crime.

Two types of research designs can shed light on this question. The first type of study is a pre-post study in which comparable data are collected before and after the installation of the hardware. The principal examples of this type of study are the Seattle Law and Planning Office's (1975) *Evaluation Report: Target Hardening*, and Musheno et al. (1978) *Television Surveillance and Crime Prevention: Evaluating an Attempt to Create Defensible Space in Public Housing*.

A second type of study is an *ex post facto* comparison of houses or stores that have been victimized with ones that have not been victimized. The difference (if one is found) between the target-hardening characteristics provides some insight into the deterrence effects of various target hardening strategies. The studies that provide empirical evidence of this type include:

Cedar Rapids, *Installation, Test and Evaluation of a Large Scale Burglar Alarm System*

Conklin and Bittner, *Burglary in a Suburb*

Kohn, *Defensible Space Modifications in Row House Communities*

Kreps, *Study of Crime in Rural Ohio*

Musheno et al., *Television Surveillance and Crime Prevention: Evaluating An Attempt to Create Defensible Space in Public Housing*

Newman and Franck, *Factors Influencing Crime and Instability in Federally Assisted Housing*

Repetto, *Residential Crime*

Scarr, *Patterns of Burglary*

Seattle Target Hardening Project

Westinghouse National Issues Center, *CPTED Final Report on Schools Demonstration*

Whitcomb, *Focus on Robbery*

A synthesis of the evidence follows.

Target-Hardening: Better Doors, Locks, Windows, Fences, and Other Forms of Access Control

The Seattle *Evaluation Report: Target-Hardening* (1975) investigated the effects of using deadbolt locks, solid case doors, construction of short walls to prevent exterior access to interior door latches, and restriction of window openings to nine inches in four public housing developments. The study showed that in three of the four housing developments there was a significant decrease in burglaries after target-hardening was completed. The changes in the burglary rates were measured through Seattle Police Department data and Seattle Housing Authority data. The police data reported post-program reductions of 50 percent, 37 percent, and 46 percent, while the housing authority showed reductions of 77 percent, 60 percent, and 64 percent. The police data were statistically significant at the .10 level, while the housing authority data were significant at the .05 level.

The study also presented evidence that the mode of entry of offenders changed after hardening. There was an increase in the percentage of entries through unlocked windows and doors. This suggests that a concurrent education program for residents might result in further reductions. But this hypothesis has not been tested.

No other pre-post study evaluated the effects of target-hardening strategies used alone for crime reduction. However, several studies of multiple-strategy programs lend support to

the conclusion that target-hardening as defined by better locks, doors, and windows reduces crime.

Arthur Young and Company's *Evaluation of the Cabrini-Green High Impact Program* (1979) evaluated strategies including target-hardening along with youth shelter, employment, and resident organization projects. The Cabrini-Green study reported that placing new locks on doors and stairways and carrying out other elements of the Architectural Security Program contributed to a decrease in interior crimes in the experimental buildings. An important element of the target-hardening strategy was the enclosure of lobbies, installation of intercoms, location of security personnel at the doors, and the use of other means to control access.

The data show that there was a marked decrease in crime and fear of crime in lobbies and interiors of buildings with access control. Interior index crimes decreased 29 percent from 1975-1977 in the experimental buildings while increasing by nearly 21 percent in the control buildings during the same period. The non-index crime rate fell 12 percent in the experimental buildings while increasing 8 percent at the control group buildings. Fear of crime in lobbies, as measured by a standardized score, fell from 1.62 to 1.28 in the experimental buildings while falling from 2.02 to 1.88 in the control group between the time of the baseline data collection and the second of the two follow-up surveys.

Several other studies provide qualified support for the proposition that access control contributes to crime reduction. Newman and Franck's *Factors Influencing Crime and Stability in Urban Housing Developments* (1980), a study of 63 moderate and public housing developments, investigated the relationship between various physical design factors and crime rates. The authors found that burglary rates were "primarily determined by accessibility of buildings and apartments." However, they

also found that personal crime rates were not significantly affected by accessibility of buildings and apartments.

The widespread use of fences as a means of access control attests to their perceived effectiveness as a crime reduction measure. But we could find no empirical support for this assumption. Kohn (1975) reported that fences contributed to reductions in crime and the fear of crime. Yet this conclusion was apparently judgmental. The study design did not permit an assessment of the fences' contribution to crime reduction, as distinct from the impact of other measures. In *A Study of Crime in Rural Ohio: The Relationship Between Ecological Factors and a Rural Crime Index*, Kreps found that the data did not support the hypothesis that fences and other precautionary defense mechanisms (target-hardening) are associated with a lower crime rate.

Other fragments of relevant data include Repetto's (1974) finding that the quality of doors is associated with burglary rates in the expected direction. Scarr (1974) found that businesses often respond to victimization with a variety of target-hardening methods, such as replacing doors, installing deadbolt locks, or placing bars on windows. But Scarr did not assess the subsequent change in victimization, if any.

Alarms

The major study of the effectiveness of alarms is one conducted by the Cedar Rapids Police Department: *Installation, Test and Evaluation of a Large Scale Burglar Alarm System for a Municipal Police Department* (1975). It was a quasi-experimental study. Matched pairs of over 100 businesses and schools with previous burglaries were chosen for the experiment. One of the pair in each case was given an alarm system which sounded directly at the police station. The other half served as the control group. The study showed that:

- Alarms had the effect of significantly reducing attempted crime. There was a reduction of approximately 55 percent in burglaries of business places with alarms from 1970 to 1971, as compared with a reduction of only 8 percent for the control group.

- Arrests at the scene were significantly higher for places with alarms. There were arrests at the scene in 31 percent of the cases in the experimental group, but in only 6 percent of the cases in the control group.

- Clearance rates were higher for places with alarms. For the stores with alarms, 46 percent of the 1971 burglaries were cleared, as compared to a 27 percent clearance rate for the control group and a 31 percent rate citywide.

- Alarms also were effective in the school demonstration effort. Burglaries decreased by 75 percent from 1970 to 1971 in the schools with alarms, and by less than 25 percent in the control group.

The findings of this study are supported by two other studies. Conklin and Bittner in *Burglary in a Suburb* (1971) reported that only 5.6 percent of 949 burglaries occurred in businesses or residences equipped with burglar alarms. In addition, in 85 percent of the burglaries where an alarm sounded, the incident came to the attention of the police within one hour. Most of the alarms covered in this study did not sound directly in police stations, but rather "went off" only at the site. These findings are also supported in part by the interviews which Repetto (1974) conducted with offenders. He found that one-third of the offenders wanted to know in the planning states of their crime whether a burglar alarm was used.

Overall, the empirical record offers the following support for the hypothesized relationship in the rationale for alarms:

- Alarms increase the probability that security personnel will intercept a crime in progress or soon thereafter. except where high false alarm rates have made them skeptical and slow to respond.

- Alarms increase the perceived risk of apprehension by offenders (as shown by the reduction in attempted crime and by interviews of offenders).
- Alarms increase the real risk of apprehension (as shown by the increase in clearance rates).
- Alarms reduce successful crime (as shown by lower crime levels and less gain per crime).

Cameras

Three studies shed light on the effectiveness of cameras in deterring crime. One was the evaluation of the Hidden Cameras Project in Seattle (Whitcomb, 1978). This was an experimental design in which 150 businesses were selected on the basis of their "likeliness to be robbed" (as judged by past attempts). Half (experimental) were selected randomly to be equipped with cameras; the other half served as controls. The cameras were *concealed* in a simulated stereo box and focused on the cash register. Cameras could be activated by employees, using either a pocket radio or a mechanism on the cash register.

The study findings showed that:

- 55 percent of the robberies which took place at the sites with cameras were cleared compared to 25 percent at the control group sites.
- 48 percent of the robbers who attacked the experimental stores were convicted compared to only 19 percent of those who attacked the control sites.
- Monthly robbery rates declined 38 percent (comparing the 11 months following installation to the 11 months before installation).

This study supports the proposition that concealed cameras in a commercial setting can produce evidence for use in investigation and prosecution.

The two other studies of the use of cameras were conducted in public housing developments. A study entitled *Television Surveillance and Crime Prevention: Evaluating An Attempt To Create Defensible Space in Public Housing* (Musheno et al., 1978) took place in three buildings of the Bronxdale Houses public housing project. The housing development had a total of 26 seven-story buildings, each containing 53 apartments. TV cameras (with sound) were placed in the lobbies and elevators of three of the buildings and transmitted pictures on Channel 3. Residents could view both the lobby (top half of pictures) and the elevator (bottom half) simultaneously. The study was a quasi-experimental design. Three buildings within the same development which did not have cameras served as the control group.

The study found that:

- The surveillance system took three years to put into place due to vandalism, bureaucratic tie-ups, and construction delays.
- Only 14 percent of the respondents used the equipment daily.
- No tenant had observed a crime on TV.
- There was no significant change in crime rates after the experiment.
- There was no significant difference in resident attitudes about crime after the experiment.

The authors concluded that the experiment (which cost approximately $1.5 million) was a failure. The post-test took place only three months after final installation of the system; but, in this instance, the short-term indicators are presumably an accurate predictor of longer-run impacts.

Another study of cameras was undertaken as part of Arthur Young's evaluation of the Cabrini-Green High Impact Program (1979). An important component of the physical design

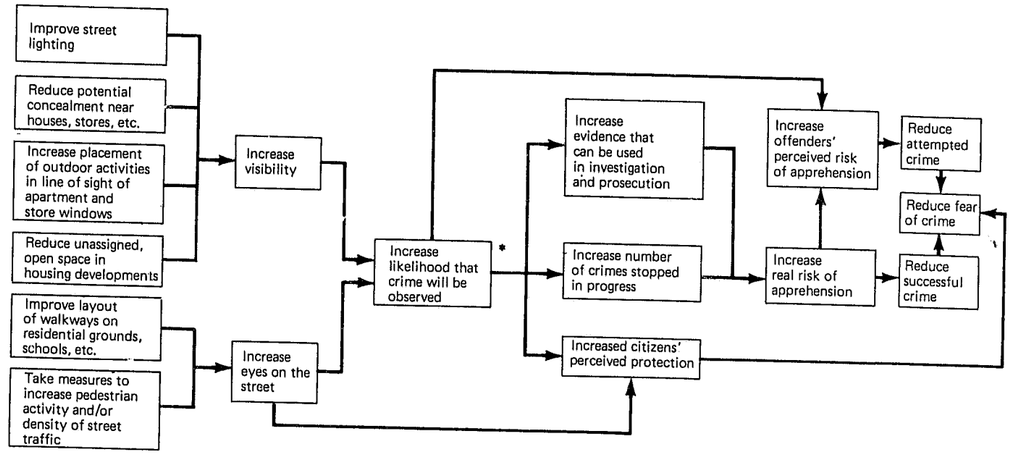
component was the placing of cameras in elevators, lobbies, and hallways. Crime and fear of crime decreased in elevators as a result of the project. But, apparently, the cameras did not contribute significantly to this reduction. Crime and fear of crime in elevators decreased equally in buildings with and without cameras. There were also reductions in crime and fear of crime in lobbies and hallways. But it was not possible to determine whether the cameras contributed to these reductions. The strategy singled out by the residents as the most effective in these areas was the presence of security guards.

In summary, the lesson of the work to date seems to be that camera surveillance works when the system ensures that something will be done with the images that the camera can provide. When cameras have relied on spontaneous responses, they have not been effective.

Summary of the Evidence: The Hardware Rationale

The hardware rationale is at the periphery of interest in the C/BE link: the finding that a good lock on a strong door makes illegal entry more difficult is less than startling. Nonetheless, the evidence for the effectiveness of the hardware solution should not be undervalued just because it was predictable. In effect, it provides a baseline against which the impact of the more innovative strategies may be compared.

The Evidence for the Social Surveillance Rationale



* Assumes a constant probability of intervention for an observed crime.

FIGURE 2. The Social Surveillance Rationale

The second major line of logic to be examined is what we have termed the "social surveillance" rationale for the C/BE link. The logic is based on the assumed willingness of people to act--whether by reporting or actually intervening--when they observe suspicious behavior. Do changes in the built environment increase the opportunities to observe crime, or the perceived risk of being observed, and thereby serve crime reduction functions?

The strategies most commonly associated with the social surveillance rationale are:

- improve street lighting and other outdoor lighting;
- reduce potential concealment hear houses, stores, etc.;

The Evidence for the Social Surveillance Rationale

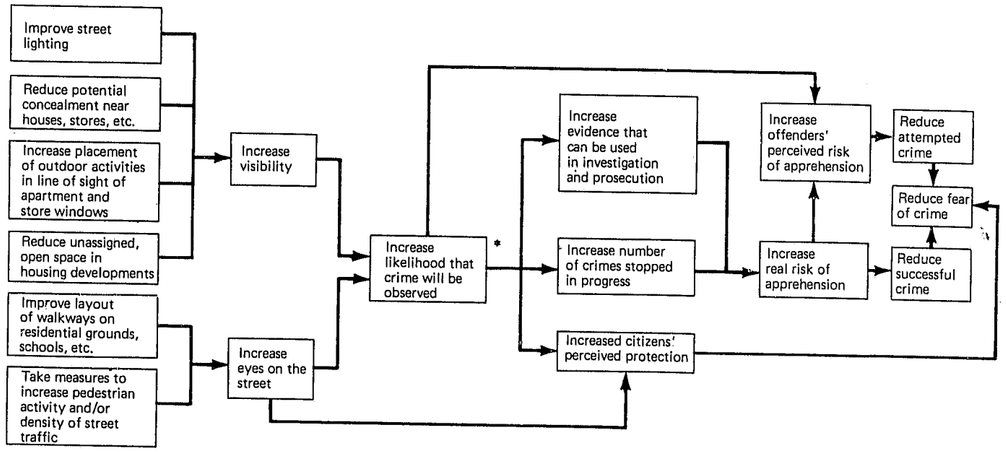


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FIGURE 2. The Social Surveillance Rationale

The second major line of logic to be examined is what we have termed the "social surveillance" rationale for the C/BE link. The logic is based on the assumed willingness of people to act--whether by reporting or actually intervening--when they observe suspicious behavior. Do changes in the built environment increase the opportunities to observe crime, or the perceived risk of being observed, and thereby serve crime reduction functions?

The strategies most commonly associated with the social surveillance rationale are:

- improve street lighting and other outdoor lighting;
- reduce potential concealment hear houses, stores, etc.;

Newman, *Crime and Instability in Federally-Assisted Housing*

Newman, *Architectural Design for Crime Prevention*

Pablant and Baxter, *Environmental Correlates of School Vandalism*

Phelan, *Testing Academic Notions of Architectural Design for Burglary Prevention: How Burglars Perceive Cues of Vulnerability in Suburbia*

Repetto, *Residential Crime*

Tien et al., *Street Lighting Projects: National Evaluation Program Phase I*

Westinghouse National Issues Center, *CPTED Commercial Demonstration Evaluation Report*

Westinghouse National Issues Center, *CPTED Final Report on Schools Demonstration*

Young, Arthur and Co., *Evaluation of the Cabrini-Green High Impact Program*

We shall examine the evidence related to each strategy, then consider multiple-strategy approaches.

Street Lighting

The most thorough study of street lighting and its impact on crime-related behaviors was conducted by Tien et al., and reported in *Street Lighting Projects: National Evaluation Program Phase I Final Report (Public Systems Evaluation)*. It is a comprehensive assessment of the state of knowledge up to 1977. It reviewed 41 projects and evaluated the 15 leading studies. The conclusions were that

> There is a strong indication that increased lighting ... decreases the fear of crime.

but

> There is no statistically significant evidence that street lighting impacts on the level of crime.

The authors cautioned that these conclusions should be accepted with reservations due to the large number of

methodological problems associated with the major (best) studies. In general, they found few studies that had collected impact data (on crime and fear of crime), and almost no study that disaggregated the crime and fear of crime measures by crime type, night/day, and street/non-street categories. Tests of statistical significance and the use of "confidence intervals within which the results are reliable estimates of the true values" were rare.

The empirical evidence Tien et al. cite in support of the proposition that street lighting reduces fear of crime can be summarized as follows:

Baltimore - 66 percent of residents feel safer

Milwaukee - 82 percent of residents feel safer, 90 percent perceive a decrease in crime

Tucson - Unspecified percentage of residents felt safer and reported less fear

Denver - 67 percent of the residents who were aware that street lighting had been changed "feel much safer," but only 43 percent of all the residents had noticed any lighting change at all

Norfolk - An unspecified percentage of "test subjects" reported increased sense of security

Portland - No impact on residents' feelings of safety and only 25 percent of target area residents were aware of increased street lighting

Tien et al., Exhibit 4.4

The empirical evidence Tien et al. cite regarding the effects of street lighting on crime can be summarized as follows:

Atlanta - Reported night crime increased in target and control area

Baltimore - Reported night crime increased by 44 percent in one year while reported rape decreased by 21 percent in one year

Denver - Reported night violent crime decreased by 11.8 percent in 10 months

Kansas City - Reported night robbery decreased 52 percent, reported assault decreased by 41 percent

Miami - Reported night crimes against persons decreased twice as much in target area as in entire city

Milwaukee - Reported auto theft increased one year after relighting while other reported crimes against property decreased

Newark - Reported Part One crime decreased by 20 percent in target area, compared with a citywide increase of 14 percent

Richmond - Reported residential burglary increased by 7 percent and reported nonresidential burglary decreased by 28 percent in one year

Washington - Reported night robbery decreased 65 percent in two years, while reported residential burglary decreased by 44 percent, reported auto theft decreased by 56 percent, and reported vandalism decreased by 22 percent

These findings are subject to a broad range of methodological problems, as the authors point out. For example, almost every study uses *reported* crime rates as the impact measure. Yet the basic logic of street lighting is that improved lighting will *increase* visibility, *increase* the likelihood that crime will be observed, and *increase* the reporting rates of crime, as preludes to crime reduction. The tension between the short-term outcome of "increased reporting" and the ultimate outcome of "reduced crime" makes the evaluator's task exceptionally difficult. If the negative findings in the above list are attributable to improvements in the reporting of crimes, they could be indicative of effective (short term) impact. If they are not attributable to changes in the frequency with which crimes are reported, they would indicate program failures.

Tien et al., found no studies that speak to this point directly. There are findings that suggest that better lighting does increase *the opportunities for observing* and intercepting crime; i.e.,

Denver	- Of residents aware of street lighting improvements, 18 percent observed crime in progress and reported to the police
Milwaukee	- 44 percent of police report lights "assist in apprehending" and 88 percent report "patrol more efficient"
Baltimore	- 14 percent of residents "go out at night more often"
Denver	- 18 percent "walk in neighborhood at night" more often

But these data do not point to an increase in the frequency of crime reports as a preferred explanation of the generally negative results. Logically, moreover, the link between better lighting and increased frequency of crime reports would seem to be a weak one. Because crime is a relatively rare event (as a Poisson distribution) and citizens' surveillance of any given spot at any given time is also a relatively rare event, the mathematics of the situation argue against major impact on crime reports or crimes stopped in progress.

In addition to the hypothesized impact on crime reports and interceptions, the rationale also posits two other short-term outcomes. These are an improvement in the evidence available for investigation and prosecution, and a deterrent effect on potential offenders. The Newark High Impact Evaluation (1974) speaks to the former. It reports that Part One crime arrests in the target area increased by 98 percent and the clearance rate by 24 percent over a period of one year, while the total number of reported Part One crimes also dropped by 20 percent during this time. But, as the study points out, these findings are confounded. A team policing experiment was taking place at the same time in the same area, and the

research design did not permit isolation of the effects of street lighting.

On the presumed deterrent effect, the data are silent. As we shall note repeatedly throughout this report, there is almost no empirical evidence on offender perceptions.*

The Tien et al. study is by far the most comprehensive examination of the research on street lighting. Other studies will be mentioned only briefly:

Based on a survey of exterior, public lighting in 29 areas in Boston, Repetto (1974) found no correlation between robbery and burglary rates and exterior public lighting. This is consistent with Tien et al.'s conclusions.

Luedtke and Associates' study of *Crime and the Physical City* (1970) found that 87 percent of their sample of 73 previously victimized residential units had inadequate or no front lighting. But there was not a control group of nonvictimized units. One cannot tell whether 87 percent is higher or lower than the percentage of units with inadequate front lighting which were not victimized in the area studied.

Malt Associates (1970) conducted a series of interviews in which they asked police officers, residents (or users), and offenders which environmental factors deter crime. The police officers indicated that street lighting is one of the two most effective deterrents. Offenders and residents/users included street lighting among the three most effective deterrents. The study included no quantitative data on the actual impact of street lighting on crime-related behaviors. Because of the

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*LEAA attempted a large-scale study of offenders' perceptions regarding the built environment. Because of technical difficulties and a projected cost of nearly one million dollars, the study was cancelled early in its development. Other, very small-scale studies have been undertaken and are discussed elsewhere in this report.

limited sample (7 police officers, 14 offenders, and 132 residents/users) and the judgmental nature of the responses, these findings at best are supportive.

Kohn et al.'s (1975) evaluation of the combination of strategies employed by Newman at Clason Point (and to some extent at Markham Gardens) concluded that new lighting contributed to the reduction of crime at night and increased the residents' sense of security. They base this conclusion on the following data:

- The number of felonies during the evening and nighttime hours decreased by more than one-half.
- Residents reported that outdoor lighting was the most preferred physical design change.
- Residents reported through drawing "safety maps" that they felt safer at night after physical modifications, including lighting, were put into place.
- Clason Point managers stated that they believed outdoor lights reduced crime and increased feelings of safety.

Data on the effects of lighting alone were not collected. The authors state that it is their opinion that the lighting "contributed considerably to reduction of crime at night and to residents' sense of safety, particularly on the front paths." The study supports that opinion.

The Westinghouse evaluation of the *CPTED Commercial Demonstration Program* also considered the impact of lighting. Different versions of the evaluation report report different conclusions. The final report (Westinghouse National Issues Center, 1979) states that:

> The visibility of activities associated with the installation of high intensity lighting seems to be associated with a major (35 percent) reduction in street crime.

The draft version of this report (prepared by Lavrakas of Northwestern University) cited the small sample sizes and other analytic considerations, and concluded that "No valid conclusion can be drawn about the impact of high intensity lighting on street crime." A follow-up evaluation now being conducted may clarify the matter.

In sum, the evidence on improved street lighting and other outdoor lighting is much like the evidence on target hardening. Simple, readily predictable relationships--in this case, that people are more afraid in the dark than in the light--are confirmed by the data. More complex relationships--i.e., that better lighting reduces crime--are not confirmed by the findings to date.

Other Strategies in the Social Surveillance Rationale

Potential concealment. Two studies assert a direct relationship between the opportunity for concealment and the level of crime. One is Molumby (1976, discussed in more detail subsequently), who analyzed crime in a single housing development and found that crimes were associated with opportunity for concealment. The other is Detrick (1977) who conducted an analysis that showed that hiding places next to a door or window were associated with higher burglary rates.

Other studies suggest a similar relationship between opportunities for concealment and fear of crime. Clay (1972) showed that the existence of an area of concealment near the apartment was positively related to the fear of crime reported by the residents of the public housing development he studied. In Brill's several studies of the fear of crime in public housing developments, he asked residents to identify fear-producing areas. The areas they identified appear to be ones in which concealment of a potential offender is relatively easy.

Tucker and Baxter (1979) presented slides with varying environmental characteristics to police officers and university students, and asked them to rate the location shown in each slide with respect to the potential for rape. Sources of concealment was one of the cues mentioned by police officers, as well as by men and women students, that contributed significantly to their assessment of risk.

There is also evidence, albeit tentative, that concealment is a factor in offenders' choices of targets. Phelan (1977, discussed in greater detail subsequently) asked burglars to rate apartments that had previously been burglarized on their suitability as targets. The responses indicated that openness and lack of concealment opportunities were minuses in calculations of vulnerability. A small study by Malt Associates in which 14 offenders were interviewed found that "obstruction to vision" was one of the two environmental factors positively associated with the study's variable for "incidence of crime."

This comprises the current state of knowledge on the role of concealment. The available evidence suggests that opportunity for concealment is linked to offender behavior, fear of crime, and occurrence of crime. Though the individual studies are limited in samples and controls, the consistency of the findings supports a causal link.

The hypothesis that follows naturally from these findings is that actions which reduce the opportunities for concealment are useful anti-crime measures. But this has not been shown. The available data show that opportunities for concealment are "bad." Whether changes of the environment that eliminate these opportunities are "good" remains to be determined.

Pedestrian traffic. Several studies have investigated the relationship of the level of pedestrian and street traffic with crime-related behaviors. Angel, in a 1969 mapping study of the incidence of crime in Oakland, found that most crimes occurred where there was either a very small or a very large volume of traffic. He concluded that there is a "critical intensity zone" such that the "right amount" of traffic is a deterrent to crime. The "right amount" provides for enough people to notice a crime but not so many that no one will take it upon himself to intervene. His design did not permit him to validate this hypothesis with independent data.

In Malt Associates' (1973) interviews of 132 residents/users, the presence of pedestrians was one of three environmental factors the respondents cited as negative correlates of crime. Differences attributable to different levels of pedestrian activity (a la Angel) were not considered. But the study does suggest that "outside surveillance indicators /that are witness-related, such as visible people on the sidewalk and building occupants/ have a greater impact on deterring the criminal behavior of the offender than inside surveillance characteristice /e.g., number of windows and floors in a building/." The study presents no statistical basis for this conclusion. It would seem useful to test it.

Ley and Cybriwsky (1974), in their study of the location of stripped cars in Philadelphia, found that stripped cars were most likely to be found near vacant houses and stores and institutional settings. The authors used stripped cars because location-specific data on criminal or other deviant behavior were not available. They suggest that their findings are generalizable to other criminal behavior.

Luedtke and Associates' (1970) analysis of a sample of 289 crimes in Detroit found that two-thirds of the sites victimized had either light or sporadic pedestrian traffic in their vicinity. In addition, 80 percent of the sites victimized had low vehicle traffic.

Pablant and Baxter in their study, *Environmental Correlates of School Vandalism* (1975), compared sixteen pairs of schools, matched for contrasting vandalism rates (one high, one low). They found that higher activity levels in the area surrounding the school were associated with lower vandalism rates.

In contrast with these studies, Repetto (1974) found that level of street traffic and number of casual observers were *not* correlated with burglary or robbery in the 39 areas he surveyed, with the exception of areas around luxury high-rise apartments. Baumer and Hunter (1978) found, through interview data from 556 respondents in Hartford, that the greater the perceived density of people on city streets, the greater the fear of victimization. They also found that lack of street traffic is not related to level of fear when residents are "socially integrated into their community." Duffala (1976) found that the amount of traffic in front of a store exhibited a statistically significant influence on crime rates. This finding must be accepted with caution, since the volume of traffic was defined in gross terms (as less or more than 10,000 vehicles per day), and the number of stores in the sample was only 39. Dietrick (1977) found that heavy auto and pedestrian traffic was associated with higher victimization rates in single-family residential areas as well as in areas with apartments and duplexes. Brill (1977) found the greatest concentration of crime in an area with especially heavy traffic. He suggests that "a factor contributing to this might be the relatively heavy traffic to and from schools moving through these blocks."

Thus, the evidence indicates that crime is associated with both low and high volumes of traffic. The former could be explained by the "eyes on the street" hypothesis. The latter can be explained by the dynamics suggested by Brill--that heavy traffic can include a large number of potential offenders, such as youths going to or from school. At Nickerson

Gardens, Brill (1977) demonstrated both effects. Crimes were concentrated in two areas--where number of pedestrians was low, and where youth gangs hang out (i.e., where the number of "pedestrians" is high). The best summary statement of the relationship between pedestrian traffic activity and crime is that it depends on who the pedestrians are as well as how many of them there are.

Accessibility. The notion of "bad pedestrians" is a component of a more general hypothesis: that the locations most accessible to outside traffic are the locations most vulnerable to crime. This has operational implications opposite to those of the "eyes in the street" approach. A number of studies support it.

Bevis and Nutter's *Changing Street Layouts to Prevent Residential Burglary* (1977) was based on types of street intersections. A cross intersection ("+") was considered most accessible, streets that formed "T" and "L" intersections were considered less accessible, and streets that were cul-de-sacs were considered to be least accessible. Streets were "scored" individually and aggregated at the census tract level. The authors were able to control for such social variables as race, income, number of poor juveniles, and other social factors that might contribute to the crime level. They found a higher frequency of residential burglaries in the most accessible blocks and census tracts (where one would expect heavy pedestrian and auto traffic).

Further support for the relationship between accessibility and crime is provided by a number of other studies: In Brill's (1974, 1978) studies of crime in public housing, he found that apartments near parking lots, streets, and recreational areas where escape routes are available experienced higher crime rates than other outdoor areas. Brantingham's (1978) innovative

study, *A Topological Technique for Regionalization*, compared blocks that are on the border of a neighborhood with blocks that are in the interior. He found that blocks on the border had significantly higher burglary rates.

Repetto (1974), Luedtke (1970), and others have found that stores on or near a corner have a higher probability of being burglarized than stores in the interior of blocks.

Luedtke (1970) found that more than 60 percent of the victimized residential units he examined were located at or near the corner of the block, and that a majority had access from an alley.

Malt Associates' (1972) interviews with 132 residents/users and 14 offenders revealed that one of the two environmental factors most positively associated with the incidence of crime is the existence of alleyways.

None of these studies provides adequate evidence on the specific relationship it examined. But in sum, they point to a strong relationship between accessibility and exposure to crime.

Multiple Approaches in the Social Surveillance Rationale

Several studies evaluated a combination of strategies that are supposed to lead directly to increased visibility and ultimately to reductions in crime and fear of crime. But none managed the complexities of multiple treatments adequately. They add little to our understanding of the hypotheses subsumed by the surveillance rationale.

Crow and Bull's *Robbery Deterrence: An Applied Behavioral Science Application* was based on a multi-factor program introduced in commercial convenience stores. Major strategies were:

- increased lighting
- placing "defensive" signs saying "Less than $10 cash kept on premises," etc.
- closing off escape routes
- unspecified training for employees.

The authors claimed significant effects. But our reanalysis of the study's published tables suggests that no significant difference in crimes rates was realized between the experimental group that received the "treatment" and a control group that received no treatment (see Appendix C). Moreover, each experimental store received a different set of treatments, but the unit of analysis was the store. The pre/post comparisons do not reveal which treatments or combinations of treatments had what (if any) effects.

Malt Associates (1972) made the claim that the following environmental factors were associated with high crime rates:

- unpaved, narrow streets
- obsolete physical structures (no maintenance)
- inadequate security maintenance
- recessed entries in commercial structures (lack of surveillance capabilities)
- intrusion of commercial uses into residential neighborhoods.

But the methodological problems associated with this study are extensive. These findings are very weak (see Appendix C).

One of the studies cited in the discussion of target-hardening strategies also included a number of other components. This was the evaluation of the Cabrini-Green High Impact conducted by Arthur Young and Company (1978). This program included the following interventions:

- enclosure of lobbies and limitation of access
- installation of intercom systems
- electronic surveillance devices (cameras) in elevators, lobbies, and hallways

- presence of security personnel in lobbies
- 7-foot fences placed around selected buildings
- coordination of social and educational services to support new changes
- development of a youth service bureau
- establishment of a youth shelter house
- women's defense and crime prevention programs.

Except for the last two components, which appear to reflect a therapeutic rationale, these measures are based on a combination of the target-hardening and social surveillance rationales.

We noted earlier that this study found a reduction in crime in specific locations, which contributed to overall decrease in crime in lobbies and interiors. The victimizations that occurred in interior places declined from 53.8 percent in the summer of 1976 (baseline survey) to 33.3 percent in the summer of 1977 (second follow-up survey). Vandalism costs fell 47 percent from 1975 to 1977; the verified personal crime rate decreased by 27 percent during this period. It was clear that significant improvements occurred.

But the changes or combinations of changes that produced these improvements cannot be determined from these study designs. The residents pointed to the presence of security guards as a major factor in reducing fear of crime in lobbies and interior places. The authors suggest that a contributing factor to the reduction in vandalism may have been a courtyard fencing program, that the Community Safety Education Program may have contributed to the reduction in personal crime. The authors also note an important qualification: "Since there were other programs taking place throughout the Cabrini-Green developments, it is difficult to attribute the reductions only to the CSE program."

Phelan's (1977) study, *Testing Academic Notions of Architectural Design for Burglary Prevention: How Burglars Perceive Cues of Vulnerability in Suburban Apartment Complexes*, consisted of three components: (1) presenting slides of apartments to convicted burglars, and asking them to express their opinions of what cues of the environment were related to their vulnerability; (2) visiting various types of apartments with convicted burglars, and asking a series of questions relating to the physical design of the apartments and surrounding areas; and (3) analyzing physical characteristics of a sample of 250 previously burglarized apartments. The burglars rated the apartments shown in the slides on a five-point scale (crime will not occur ... will definitely occur) and then explained their ratings, Open-ended interviews were conducted on-site at the apartments. Phelan found that burglars were very concerned with "openness," lack of concealment opportunities (i.e., visibility), and the presence of neighbors or pedestrians. They were not very concerned with hardware. This provides modest support for the logic of the social surveillance rationale.

A final set of studies which investigates a combination of physical design strategies is Molumby's (1976) *Study of Patterns of Crime in a University Housing Project*. Molumby found that the location at which crimes occurred had a number of physical characteristics which fit the social surveillance rationale. These included:

- poor street lighting and visibility,
- large shrubs and potential for concealment,
- heavily traveled intersections nearby,
- no building across the street.

Molumby concluded that "The physical environment is a major factor in criminal behavior." Further results will be forthcoming from Molumby's ongoing evaluation of the impact of physical design changes in the housing development.

Summary of the Evidence: The Social Surveillance Rationale

The available evidence is reasonably persuasive in demonstrating an empirical link between the major elements of the social surveillance rationale and crime. The following can be said:

- Security guards and other protection measures reduce people's fear of crime.
- Illumination and visibility reduce people's fear of crime.
- When combined with other anti-crime measures illumination also appears to reduce the incidence of crime.
- Environmental features that afford concealment increase vulnerability to crime.
- Isolation increases vulnerability to crime.
- Heavy traffic increases vulnerability to crime.
- Easy access/egress increase vulnerability to crime.

None of these is a surprising finding.

There are two kinds of gaps. One is that the dynamics which are presumed to link a certain environmental characteristic with crime-related behavior have not been explored in a step-by-step fashion. The data are especially sparse on the components of the rationale that depend on the offender's perception. A major study of this dynamic was begun by Yin in 1978 but aborted after the design phase because of technical difficulties and cost. Without adequate information on the "how?" and "why?" it is difficult to prescribe effective countermeasures.

The second is that most of the data come from *ex post facto* analyses. There has not been sufficient experimental work in

which specific predictions are made and tested. The evidence that "undoing" negative characteristics of the environment changes victimization is uniformly weak.

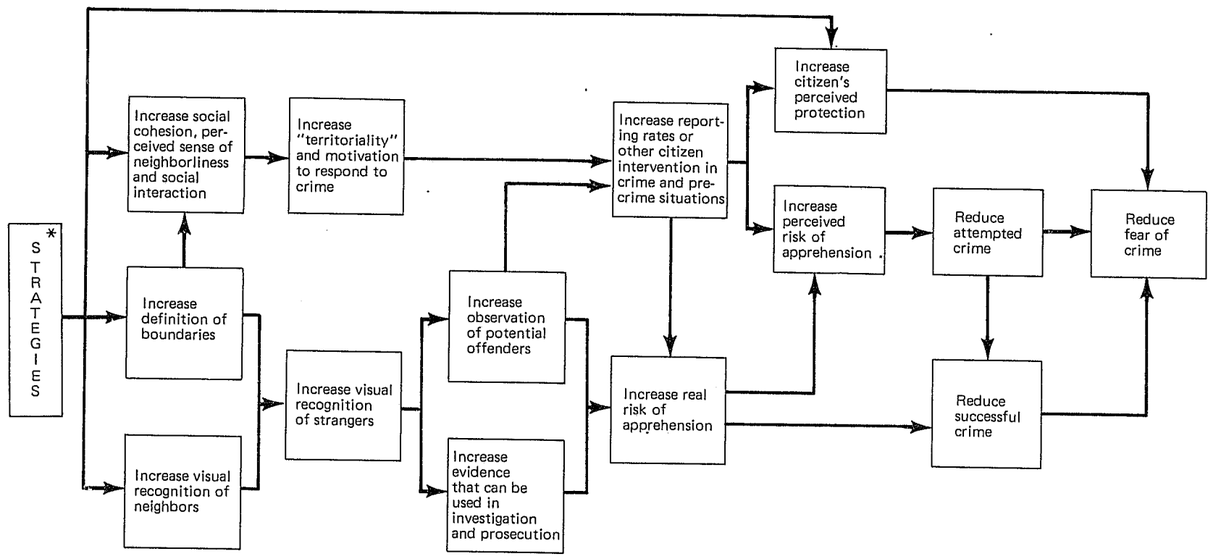
The Evidence for the Community-Building Rationale

The rationale that underlies the community-building approaches contains many of the elements also found in the earlier rationales; e.g., visibility, access, etc. But it differs from these in the introduction of a number of hypothetical constructs that are thought to mediate the relationship between characteristics of the built environment and crime. The basic assumptions are that:

- The state of affairs with respect to these constructs at a given locale affects the behavior of both residents and potential offenders, and therefore the chances of crime.
- Characteristics of the built environment help to determine the state of affairs with respect to these constructs at a given place and time.
- Appropriate changes of the built environment will improve the current state of affairs and thereby lessen crime.

The general conceptual scheme is shown in Figure 3, on the following page.

The introduction of these hypothetical constructs has two important effects. The first is that it greatly increases the number and variety of interventions that can be postulated as potentially useful counters to crime. In addition to the actions that have logical links to the incidence of crime, this rationale (unlike the others) also encompasses actions that may change the mediating state of affairs but do not have a direct connection with crime. A clean-up and paint-up campaign might be viewed as a potentially useful crime-reduction measure,



* Improved street lighting • Increase use of shared public spaces in housing developments • Reduce number of families per entrance and number of apartments per floor in housing developments • Reduce unassigned, open space in housing developments • Increase use of cul-de-sacs and other restricted street configurations • Reduce height and size of housing developments • Increase distance of stores and houses to street • Reduce incongruities and conflicting uses of land • Increase the level of maintenance and aesthetic appeal of public and semi-public spaces • Create hierarchy of zones from public to private space • Increase use of walkways in open areas • Location of Block (residence, store) in interior of neighborhood rather than on border of neighborhood • Increase use of symbolic barriers (landscaping) in housing developments, school grounds, etc.

FIGURE 3. The Community-Building Rationale

for instance, because of the role it might play in developing the neighborhood solidarity that countermeasures depend on.

A second, related effect is that the domain of relevant research also is expanded. There are three markedly different types of research that can be (and have been) undertaken on the C/BE links mediated by community-building. For purposes of this synthesis, we shall label these Types 1, 2, and 3, as a shorthand for the following distinctions:

- *Type 1 measures* explore the relationship between environmental characteristics and crime-related outcomes. The intervening constructs are not measures; they are used to select variables of interest and to interpret the results.

- *Type 2 measures* explore the relationship between environmental characteristics and intervening constructs. They use measures of the state of affairs with respect to these constructs as (intermediate) criteria rather than measures of crime.

- *Type 3 measures* explore the relationship between intervening constructs and crime-related outcomes. Their purpose is to validate the utility of these constructs against palpable impact on crime.

There can be (and have been) studies which try to explore all of these relationships: to link the environment to the construct and then the construct to crime.

Each of these types of studies could be done in two ways. A study can be based on *natural variations* in the environment; i.e., on correlations between the variables of interest across different locales. Or it can be based upon *manipulations* of the environment; i.e., on pre- and post-intervention measurements at locations at which changes have been made. We shall divide our review of the evidence into these two broad categories of data.

Studies of Natural Variation

In *Defensible Space* and *Architectural Design for Crime Prevention*, Oscar Newman suggests that large housing developments experience high rates of crime because they foster feelings of anonimity, isolation, and impersonality; and that the appropriate countermeasures are to reduce the size of projects and building height, and to incorporate design features (e.g., subdivisions and boundaries) that establish zones of influence and privacy. He develops this hypothesis through three basic constructs:

(1) *Territoriality*--The physical (built) environment can create perceived zones of territorial influence that encourage tenants to adopt proprietary attitudes and to employ "potent territorial prerogatives" that can act as a natural and important crime deterrent.

(2) *Natural Surveillance*--The physical (built) environment can provide surveillance opportunities for residents that can contribute significantly to securing the environment for "harmonious activities" and reducing fears and anxieties concerning criminal victimization. Improved surveillance opportunities function most effectively as a crime deterrent when they are provided in the context of subdivisions of residential areas (the "privatization" of space) for which the individual considers himself responsible.

(3) *Image and Milieu*--The physical (built) environment can influence one's perception of a residential complex's "uniqueness, isolation, and stigma." These perceptions can contribute to making a given environment vulnerable to criminal activity.

Newman applied these constructs initially to three studies in New York City. In the first, he examined the relationship between crime rates and a number of project and building characteristics, drawing on archival data from over 100 housing projects. In the second, carried out at the Van Dyke and Brownsville projects, he also included tenant attitudes. In the third, based on a survey of 425 tenants in seven projects, he focused on fear of crime rather than occurrence. The findings were as follows:

- Crime and fear of crime are relatively high in public housing developments.
- Larger housing projects experience higher crime rates.
- High-rise projects experience higher rates of crime within their buildings and interior public spaces than do low-rise projects.
- Crime rate rises with building height, until a leveling off at approximately 13 floors.
- Twice as many residents of low-rise (three stories) developments rated their buildings as safe or fairly safe than did residents of high-rise developments (32 percent to 16 percent, respectively).
- Residents feared stairs and elevators more than lobbies or halls. Stairs were the most fear-producing; lobbies the least fear-producing.
- The number of people who stated that all persons on their floor would accept a package for a neighbor was more than twice as large in low-rise units than in high-rise units. The number who stated that no one would accept delivery was the same for low- and high-rise units.

Though some of the differences were small, each of these relationships is supported by the data. All but the last of these findings are of the form that we have called Type 1. They associate a certain physical characteristic with a crime-related

outcome. They do not speak to the intervening links, and therefore provide no evidence on the validity of Newman's constructs. Each is as consistent with the hypothesis of the social surveillance rationale (or other explanations) as with Newman's assumptions. The last finding (on accepting packages for neighbors) is Type 2. It links a physical characteristic with an intervening construct. If neighborliness is in turn linked to crime or fear of crime, it would support the model. But this link has not been demonstrated. Indeed, Becker (1974) found that an analogous indicator (having 20 or more neighbors to whom one says "hello" in a housing development) did not correlate significantly with the residents' sense of security.

Thus, these early studies are best described as exploratory. They suggested that project size, building type, and building size are related to crime rates. They did not suggest the reasons. In *Community by Design: A Study of Moderate-Income Federally Assisted Housing*, Karen Franck (1978) focused on the links. She explored the (Type 2) relationships associated with the distribution of apartments among and within buildings, and found that:

- The larger the number of apartments that form an identifiable group within the building, the stronger the sense of cohesion. There is a greater likelihood that a tenants' association will be formed and that tenants will work on problems together.
- The number of apartments per floor is negatively related to most aspects of "community," including residents' use of space, attachment, and sense of cohesion.
- The number of apartments per floor is *positively related* to turnover rate, the perceived quality of maintenance, and perceived influence over management.
- The number of apartments per floor is *not related* to joint problem-solving, acquaintanceships, or level of kinship/friendship.

At the level of Type 1 relationships, she found that number of apartments per floor was positively related to personal safety (despite its negative effect on such cohesion). Franck also tried to validate a number of the intervening constructs against fear of crime. She found that

- the level of friendship/kinship has a significant positive effect on perceived safety, but
- the level of acquaintanceships has a significant negative effect on personal safety.

These are Type 3 findings on fear of crime. Analyses based on the actual incidence of crime were not included in this study. Some of the relationships suggested by Franck's data fit neatly into the community-building rationale and tend to support it. Some do not seem to fit. A few seem to contradict it. It seems safe to conclude that the relationship surrounding Newman's constructs are subject to complex contingencies involving multiple factors.

The most ambitious attempt to date to unravel these complexities was a collaborative effort by Newman and Franck, described in *Factors Influencing Crime and Instability in Urban Housing Developments* (1981). As the title suggests, instability (turnover, vacancies, expressed desire to move) was used as a dependent variable as well as crime. Crime was divided into burglary, personal crime, and fear of crime. A wide range of design features and constructs related to the notion of defensible space was included. The sample consisted of 63 low- and moderate-income housing sites in three cities. The data sources were interviews (of development managers, police, and residents) and archival information. The analytic method was path analysis. Two separate models were tested. One used personal crime, fear of crime, and instability as the dependent variables. The other used burglary instead of personal crime.

The Type 1 findings reported by Newman and Franck were that:

- Burglary rates are determined primarily by the accessibility of buildings and apartments.
- Personal crime rates are not significantly affected by accessibility of buildings and apartments.
- Fear of crime is significantly affected by building size.
- Instability is determined by building size, accessibility, and number of low-income/AFDC tenants.
- "Two physical design variables, building size and accessibility, and two social variables, low-income/AFDC and teen-adult ratio, are the major determinants of crime, fear, and instability."

To elaborate these findings, Newman and Franck examined the related Type 2 findings (from environmental characteristics to intervening construct) and Type 3 findings (from intervening construct to dependent variable). They traced the relevant link through three intervening constructs: control of space, use of space, and social interaction. Their conclusions are as follows:

Control of space (perception of tenant that neighbors would intervene if suspicious or criminal actions occur outside their apartments).

- Building size has a significant effect on control of space.
- "Low control of space is a precipitating factor in causing burglary, personal crime, fear, and instability."
- "The greater the residents' control ... the less severe the problem, whether it is burglary, personal crime, fear, or instability."

- "Although the overall (total) effect of building size on crime is not large, building size does show important indirect effects on both forms of crime (burglary and personal) and on fear through control of space."

Use of space (nature and extent of use residents make of both private and shared outdoor areas).

- Building size has significant effects on use of space.
- "Residents' use of space transmits effects of building size both to personal crime and fear of crime."
- "Use of space and control of space are important links from building size, low income/AFDC, and teen-adult ratio to each of the crime-oriented variables--burglary, personal crime, and fear--but not to community and stability. The less residents have extended their domain of concern, the higher the rate of crime and fear of crime."

Social interaction (nature and extent of social interactions with other tenants and feeling of "belonging").

- "The larger the building, the less frequently residents interact and, in turn, the lower the rate of personal crime."
- "The higher the level of social interaction, the higher the crime rate."
- "The greater the accessibility of buildings ... the lower the social interaction among residents. Social interaction, in turn, affects community instability: thus, accessibility affects instability through social interaction. Accessibility also affects instability through burglary."

Some of these findings are easy to accept. That accessibility is related to burglary rates, that low control of space is related to crime and fear of crime, that building size is related to tenant interventions are consistent with other

findings (and other rationales). They confirm the mainstream of thought in C/BE research and are useful contributions. The other findings are hard to accept. That high rates of social interaction are associated with high rates of crime, that accessibility is unrelated to personal crime run counter to logic (and to Newman's earlier work). We checked the methodology carefully. We believe that these latter "findings" may be by-products of methodological quirks in Newman and Franck's procedures.

There are three major problems. The first derives from the indices that Newman and Franck used to measure the central constructs. Accessibility is an example. Because their sample was not limited to high-rise units, but also included row houses and walk-ups, Newman and Franck had to develop indices that would enable them to compare the respective accessibility of these apples, bananas, and pears. They did this by using "vulnerability to criminal intrusion" (our term) as a common denominator in defining the "relative accessibility" of different kinds of structures. In the case of row houses, for instance, they measured accessibility by counting the number of groundfloor windows. For Type 1 studies of crime-related outcomes (and especially burglary) this makes sense. But, for Type 2 studies of social dynamics, these indices break down. The finding that "The greater the accessibility of buildings ... the less the social interaction" in effect asks us to believe that number of groundfloor windows affects interactions with neighbors and feelings of belonging. Believing that the index is faulty is simpler. The second problem is the unreliability of the estimates of incidence of crime. These estimates were based on self-reports of tenants. The median number of interviews from which the crime rate at a given site was calculated was 34. In fourteen of the 63 sites, the number of tenants interviewed was less than 20. Such samples are far from adequate for a stable estimate of an infrequent phenomenon (crime). The finding that accessibility

does not affect personal crime is counterintuitive. It is simpler to believe that the high error of measurement flipped the sign of the (true) coefficient.

The third problem is that of the chicken and the egg. In path analysis, the sequence of effects is specified by the researcher. Newman and Franck decided which came first (and therefore emerged as "causes") and which came later (and therefore emerged as "effects"). In all of the analyses involving instability, the ordering could have been reversed. Thus, Newman and Franck chose to put control of space before instability, and found that "Low control of space is the precipitating factor in causing ... instability." Having uncaring neighbors makes people want to move. With equal justification, they could have reversed the order and treated instability as a causal factor of control of space. The proposition that people who are eager to move away do not care about their neighbors would seem to be equally sound.

These and other procedural discrepancies are described in greater detail in Appendix C. We note them not to deprecate an ambitious piece of research, but to point up the similarity of the state of evidence on community-building to the evidence on target-hardening and social surveillance. Again, the credible findings are limited to simple, almost self-evident relationships. Attempts to probe the more subtle dynamics have foundered.

The lasting contribution that Newman and his associates have made to the field has been to call attention to the importance of the social milieu in the C/BE link. The community-building rationale goes a step beyond the target-hardening and social surveillance rationales, which stop with the opportunities that the built environment offers for crime and anti-crime responses. It suggests that the physical environment also influences people's motivation to act on these opportunities; and, at least in general terms, the data tend to support this.

Manipulative Studies

From a policy perspective, manipulative studies are of far greater interest than analyses of natural variations. The latter merely suggest directions. Hands-on experiments show what can (or cannot) be done when these notions are put to work in real-world situations.

The most provocative of the studies in this group is Fowler et al.'s (1979) evaluation of the Hartford Neighborhood Crime Prevention Program. The program took place in the North and South Asylum Hill neighborhoods of Hartford and consisted of three sets of strategies to reduce crime and fear of crime. These were:

Physical design changes in North Asylum Hill only

- Elimination of several through-streets in the neighborhood by blocking their entrances, creating cul-de-sacs, narrowing entrances, and changing two-way streets to one-way streets. A total of 11 changes were made in public streets.

- Creating of better definition of space by adding strategic landscaping, enclosing and upgrading open and porous spaces, and constructing entrance ways.

Police activities in both North and South Asylum Hill

- Permanent assignment of men to particular geographic areas of neighborhood

- Decentralized command

- Development of a formal relationship between residents and police

- Improving the information available to police regarding patterns of crime.

Anti-crime activities undertaken by residents and community organizations in both North and South Asylum Hill

- Formation of neighborhood community organization

- Pursuit of anti-crime activities as they evolved from interests/perceived needs of residents

The police and resident activities were implemented in both North and South Asylum Hill between 1974 and 1976. The physical design features were implemented in 1976 in North Asylum Hill only. South Asylum Hill was used as a comparison group.

The evaluation was based on time series data from citizen surveys (1973, 1976, and 1977), police records on offenses, and structured observations. Data were collected on the following crime-related outcomes: burglary rate, robbery/purse snatch rate, resident perceptions and feelings with respect to crime, pattern (location) of robberies, car theft rate, mailbox theft rate, other theft from premises, and fear of crime. To permit Type 2 and Type 3 studies of the intervening variables, data were also collected on traffic patterns, use of neighborhood space by residents, residents' relationships to neighborhoods and neighbors, relations between police and citizens, and territorial behavior of residents.

From 1973 to 1976, i.e., before the physical changes were made in North Asylum Hill--crime increased in both areas. In North Asylum Hill, burglary rates (per hundred households) rose from 7.5 to 18.4, while robbery/purse snatch rates went from 2.7 to 5.1. Other property crime rose from 3.4 in 1975 to 3.9 in 1976. In South Asylum Hill, burglary rates went from 2.2 to 7.8 while robbery/purse snatch rates went from 0.8 to 3.6. Fear of crime measures also rose significantly during this period in both locations.

In 1977, after the physical changes had been made in North Asylum Hill, crime and fear of crime dropped at this location:

	1976	1977
Burglary rate	18.4	10.6 (per 100 households)
Robbery/purse snatch	5.1	3.7 " " "
Other property	3.9	2.5 " " "
Crime viewed as "a big problem"	46%	31% (of respondents)

Data collected from the South Asylum Hill area (and for Hartford as a whole) did not show a significant decrease in any of these categories from 1975 or 1976 to 1977. The authors conclude that " ... physical design strategies among all the strategies employed made the crucial difference between the presence and absence of program impact."

The strong point of the demonstration program was that it apparently contributed to a reduction in crime and fear of crime. The strong point of the research design was that it sought to test the links hypothesized by the community-building rationale. The results were disappointing. For example, the planning team believed that street traffic and pedestrian activity were so high that they were "depersonalizing," and sought to reduce them by the physical changes made. But the impact of the changes on traffic and pedestrian activity were so small that they could not have been an important factor in the drop in crime.

Other Type 2 studies also yielded negative findings. The physical changes had no apparent effect on social cohesion, no effect on the residents' control of space, no effect on their motivation to respond to suspicious behavior or crime that they observed. Perhaps, the eight-month interval between the changes and the evaluation was too short to produce these kinds of changes; a follow-up it testing this.

On two variables, significant changes were found. There was an increase in the number of persons who made arrangements with neighbors to watch their house when they were away, and in the residents' rating of ease of identifying a stranger.

The authors did not speculate on the effect, if any, that these changes may have had on the outcomes.

The Hartford experience is the major demonstration to date that changes in streets and other physical characteristics can contribute to crime reduction. It would seem important to replicate it at other locations.

Another attempt to pin down the Type 2 links experimentally was Chenoweth's (1974) study of *The Effects of Territorial Marking on Residents of Two Multi-Family Housing Developments: A Partial Test of Newman's Theory of Defensible Space*. This study was a pre-post evaluation of the effects of physical design changes made at three rowhouse public housing developments in a small midwestern city. Surveys were administered to residents before the design changes were made and one year later (but because of the time required for construction, the follow-up survey in fact occurred only two months after the major portion of the design changes had been completed).

The design changes were intended to produce definite zones of influence and thereby to change the residents' behavior in accordance with Newman's constructs. The following changes were made:

- Two-and-one-half foot high wooden fences were installed to define semi-private spaces. This fencing consisted of a single rail running between posts, symbolically demarcating the transition from one zone of influence to another.
- A four-foot high fence was installed to enclose the outdoor areas adjacent to the rear of each dwelling unit to provide private enclosed spaces.
- Groups of three to five buildings which had either adjacent fronts or faced each other were color-coded. The facades of these buildings were also changed to make them

similar to each other and set them off from nearby groups of buildings.

- The color of fencing was also color-coded to distinguish groups of buildings.
- Pathways across the sites were limited to provide greater direction to pedestrian traffic.
- Streets were widened in order to allow residents to park their cars directly in front of their dwelling units.
- "Speed bumps" were installed at the transition points from one color-coded group of buildings to another.
- Garbage disposal alley units were changed from individual cans at the rear of each dwelling unit to common dumpsters shared by residents of each group of buildings.

Pre- and post-program data were collected on the following variables:

- satisfaction with the physical environment
- proprietary attitudes and control of space
- territorial behavior (taking action in response to hearing a person walk outside one's windows or doors)
- social cohesion, neighborliness, friendliness with other residents, helpfulness, etc.
- perception of crime and fear of crime.

Data on the occurrence of crime were not included.

From the standpoint of the community-building rationale, the study made the right kinds of changes, and asked the right kinds of (Type 2) questions. But, as in the Hartford study, the physical design changes had no significant effect on the intervening outcomes. Again, the short period of time between intervention and follow-up may have militated against significant findings.

Kohn et al.'s (1975) *Defensible Space Modifications in Row House Communities* was a pre-post evaluation of the effects of physical design changes on resident behavior, attitudes, and crime levels. The main body of the study collected data on Clason Point, Markham Gardens, and two other comparison developments in Washington and Baltimore. A smaller section of the study compared crime data for Clason Point to data from three surrounding housing developments.

The following changes were made:

Clason Point:

- Apartment exteriors--Cement and stucco facing was added to apartments to provide insulation, variation among apartments, and decrease stigma through making the units more attractive.
- Outdoor space in front--Front paths were widened and curbing installed to mark boundaries between path and lawn, and discourage use of lawn as pathways. Curbstones were placed on borders of the lawns.
- Backyard area--Fencing was installed to divide areas into semiprivate clusters, limit nonresident rear door access, and direct pedestrian activity to the front areas.
- Public paths and activity areas--Paths were widened, lights were installed, benches and play equipment were added to create several small play areas and one central play area.

Markham Gardens:

- Apartment exteriors--No changes were made to the pseudo brick facing already in place.
- Outdoor space in front of apartment--Front paths were widened, curbing was installed along paths and border of lawns, and lighting was added.

- Backyard area--High fences were placed to form clusters of semi-private zones with gates leading to public streets.

- Public paths and activity areas--Small recreation areas were created in the clustered back yards.

The analytic power of the study is substantially diminished by two constraints: the two other (Washington and Baltimore) developments were significantly different from Clason Point and Markham, and the physical design changes at Clason Point were substantially different from those implemented at Markham.

The Type 1 findings were that:

- There was a notable reduction in burglary, robbery, and petty larceny at Clason Point after the modifications.

- Evening and nighttime felonies at Clason Point decreased by one-half after the modifications.

- Vandalism doubled at Clason Point after the modifications.

- The geographical location of crimes at Clason Point was different after the modifications.

- The residents' reported sense of safety at Clason Point increased markedly after the modifications.

- The reasons given by the residents of Clason Point for their increased feelings of safety included the new lighting, but none of the other physical changes.

- At Clason Point, one-third of the residents thought the crime problem had gotten worse, one-third "better," and one-third "the same." At Markham Gardens, 54 percent thought "better." 27 percent thought worse.

- At Clason Point, 36 percent of those who believed that crime problems had gotten

better (13 persons) thought that the modifications were responsible. The same number of people had no explanation.

- At Markham Gardens, 36 percent thought that police patrols breaking up drug traffic was the major reason. Only 2 percent (1 person) attributed the "better" crime situation to physical changes.

These findings are noteworthy for their inconsistency. They provide little support for a crime deterrent effect, as the authors acknowledge.

The Type 2 findings at Clason Point were that

- "Neighboring" did not increase after the modifications.

- Number of acquaintances that residents had at Clason Point did not increase significantly after the modifications.

- Fewer residents participated in the maintenance of public places after the modifications.

- The creation of clusters had no effect on the residents' behavior or attitudes toward each other.

- The percentage of residents who felt that their homes were their property rose from 43 to 73 after the modifications.

Only the last of these findings is consistent with the model's predictions. As in the preceding studies, these were not the expected social effects.

Hand's (1977) report on *Cincinnati Housing Authority* ... is an evaluation of a crime-reduction program designed by William Brill. Half of the residential buildings (in public housing) received the recommended changes; the other half did not. The changes were:

- new gabled roofs
- refurbished exteriors
- additional outdoor lighting
- addition of strategically located surveillable sitting areas
- addition of playgrounds
- creating of individual yards by changing sidewalk paths and adding low brick walls.

Hand states that "In the renovated areas fewer criminal victimizations, less fear of crime and behavioral alterations due to crime were reported." He notes that no successful burglaries occurred in the sample of renovated units, compared to 20 successful burglaries in the sample of unrenovated units. These results are consistent with the Hartford findings: a combination of physical change strategies, designed to promote social cohesion, neighborliness, surveillance, control, and territoriality can effect reductions in crime. They go beyond the Hartford findings in showing that this occurs even without companion police and resident programs. But, again, there is no direct support for the community-building rationale; i.e., for the intervening constructs. The improvements in lighting and opportunities for surveillance may have produced most or all of the observed effect.

Summary of the Evidence: The Community-Building Rationale

The Type 1 findings of the studies inspired by the community-building rationale add to the evidence generated by the studies cited earlier: the C/BE link is real. Natural variations in the physical environment are associated with differences in crime and fear of crime. Manipulations of the environment produce improvements.

That "territoriality," "social cohesiveness," and the other constructs of the community-building rationale mediate the C/BE link has not been shown, however. No study has been able to associate physical changes with behavioral changes in a definitive manner. In one sense, this may not seem important. If changes based on these constructs are effective, it can be argued that the validity of the constructs is academic. One can produce the desired results without understanding the reasons.

Many public actions proceed in such a manner. However, changing streets, creating private zones, and modifying buildings are costly interventions. That they are *necessary* (not merely sufficient) has to be shown. This has two components:

- The first is to demonstrate that changes in the social milieu result in more significant improvements than the generally simpler changes suggested by the other rationales. This must be done to validate the *constructs*.
- The second is to demonstrate that these kinds of changes can be achieved more efficiently by changes in the physical environment than by the "softer" organizational/educational interventions that also can change the social milieu. This must be done to validate the *approach*.

The available data on the first step tend to be negative. Studies related to the second (i.e., of physical vs. organizational interventions) have not been attempted.

This concludes our survey of the state of the evidence. Taken point by point, it raises as many questions as it answers. The "yeses" and "nos" are outnumbered by the "maybes," "sometimes," and "it depends." We now turn to our appraisal of how these pieces fit together, and their implications for subsequent research on the C/BE link.

Section IV:

Conclusions and Implications

SECTION IV
CONCLUSIONS AND IMPLICATIONS

Throughout the preceding discussion, we have tried to summarize the evidence on each topic as we discussed it, and to make an overall appraisal of what the findings show. We can summarize these summaries with three basic points:

1. The available evidence does suggest that changes in the physical environment (and especially combinations of changes) can reduce crime and fear of crime. This does not happen consistently. But it does occur.

2. The available evidence does not illuminate the dynamics. Except for simple, almost self-evident relationships (e.g., stronger doors reduce the risk of burglary, better lighting decreases fear, hidden cameras increase successful prosecution), the links remain obscure. Tests of the hypotheses that underlie the surveillance rationales (e.g., the "eyes on the street" hypothesis) have resulted in contradictory findings. The behavioral changes predicted by the community-building rationales (e.g., in social cohesion) have consistently failed to appear.

3. Because of this lack of cause-effect information, the present knowledge base cannot be used to prescribe. It does not tell whether a given strategy is likely to be effective in a given situation. It does not suggest the kinds or numbers of strategies to use. It does not identify the conditions (if any) under which a design strategy is a cost-effective approach.

The literature is conceptually rich, empirically impoverished.

In a sense, this lack of findings itself is a finding. What does it imply? Proponents of the approach would probably attribute it to the difficulty of C/BE research. They would

claim that the constraints on manipulating variables, the limited controls, the problems of operationalizing and measuring the basic constructs preclude clearcut findings. Skeptics would disagree. They would argue that robust relationships transcend methodological shortcomings. If so much data has shown so little, the C/BE relationship must be extremely weak.

How much of the low yield to date is attributable to each of these factors is a matter for conjecture. The data do not tell. In this concluding section, we shall venture our own opinion. If we could see the "big picture" that is not revealed by the partial and probably distorted glimpses the data base affords us, what would be its major characteristics? What would be its implications for policy and practice, and for future research?

The C/BE Relationship

We begin with the impact on fear of crime because the role of the physical environment in triggering fear is well established. That changing the stimulus complex can change fear reactions hardly needs to be proved. We are inclined to accept the reductions in fear that have been reported as valid. In fact, we believe that *changes in the physical environment are probably the fastest way of reducing fear of crime*. Since the response is to the program's inputs (lighting, fences, security stations) rather than its outcomes, almost instantaneous impact can be expected.

Our concern is with the utility of reducing fear *per se*. If the risk of crime is high, and if these measures do not reduce it, creating a false sense of security would seem to have little advantage. The initial impact surely would be short-lived, moreover. Once the lights, fences, guards become part of the accustomed scene, continued episodes of crime should raise the sense of fear to its former level (or, conceivably,

higher). If the risk of crime is low--i.e., if the level of fear is inflated--these measures could help to bring the reality and people's perception of it into closer correspondence. But this would simply accelerate a process that would occur over time in any event. That speeding it up justifies the cost is open to question.

What we think the big picture would show is that there is only one type of situation in which interventions expressly designed to reduce the level of fear are useful. This is in the context of *anti-crime initiatives that depend on an active resident role*. Physical security measures introduced concurrently could help to elicit support. In all other situations, the appropriate goal is a palpable reduction in crime, and it is by their impact on crime that interventions are properly judged.[1/]

As our review indicates, there are two primary ways in which changing the physical environment is expected to counter crime. One is by *increasing the difficulty of access or evasion*. The other is by *creating a social ambience that is mutually protective*. We shall consider these in turn.

Access and Evasion

Again, we begin with a proposition that does not seem to require empirical proof. If a residence or commercial establishment lacks one or more of the "standard" obstacles to access and evasion (locks, lights, occupants), it is more vulnerable to crime than one in which these elements are present. It is logical to expect high rates of crime at extremely "soft" locations.

1/ The National Institute of Justice believes that research findings too recent to be included in this review support the hypothesis that aspects of the physical and social environment such as vandalism, litter, abandoned property, and the presence of loiterers can convey a sense of disorder that is fear-producing in itself. Fears such as these could presumably be reduced by dealing with their environmental causes.

It is equally logical to believe that changes which have "unsoftening" effects will be useful in these situations. Adding the standard elements that are missing should reduce the rate of crime. As shown by a number of the studies we reviewed, the empirical evidence supports this expectation.

Similarly, it seems safe to assume that residences or commercial establishments which contain one or more special safeguards against access/evasion (alarms, cameras, security guards) will be more resistent to crime than locations which are limited to the standard safeguards. It seems safe to assume that the addition of one or more special safeguards will help to reduce the rate of crime. The studies that we reviewed tend to bear out also this assumption.

When a residence or commercial establishment is not extremely soft, and when the safeguards that are added are not special security measures, this logic does not apply. Changes that harden existing, conventional safeguards should not be expected to result in a significant drop in crime, in our opinion. Two factors would tend to prevent this.

The first is that *the relationships clearly are not linear*. The change from flimsy locks to adequate locks or from darkness to illumination is intrinsically more potent than a change from adequate locks to extra-strong locks, or from illumination to brightness. Improvements above a certain (unknown) threshold are likely to achieve little. Also, as we have seen in the case of pedestrian traffic, other dynamics come into play. The level of traffic that avoids isolation appears to be a positive feature; higher levels increase accessibility, and can have negative effects.

The second is that *the positive effects attributable to improvements in conventional safeguards are unlikely to be picked up statistically, even when they occur*. Relative to the many other determinants of crime, the leverage exerted by these kinds of improvements surely is small. It would take

far better controls and much larger sanples than normally available to detect the resulting changes. The situation seems analogous to one encountered continually in the "human engineering" of equipment and displays; e.g., of aircraft instrument panels. There is little doubt that changes which emphasize the difference among different warning signals reduce the risk of serious pilot error. But, because of the infrequency of malfunctions, the modest probability of pilot mistakes, and the opportunity for timely corrections, it may be impossible to prove this in in-flight situations. Many of the practical recommendations for reducing crime by target-hardening may not be subject to easy validation even though they have merit. Changes in rare events are hard to prove; changes in combinations of rare events are that much harder.

The big picture on changes which limit access and/or evasion therefore seems to us to be generally favorable. Demonstrable and probably cost-effective improvements can be achieved when the standard safeguards are lacking. Univerifiable improvements of unknowable cost-effectiveness can be achieved by upgrading the safeguards that already are present. Demonstrable but not necessarily cost-effective improvements can be achieved with special countermeasures. Unplanned effects are a possibility in measures that operate on visibility/surveillance.

Protective Ambience

The rationale that we have described as "community building" depends on two kinds of assumptions, which we have called Types 2 and 3. The former relate to the impact of the physical environment on people's transactions with neighbors and outsiders. The latter relate to the impact of these transactions on the occurrence of crime. We have noted that the empirical evidence has not supported either. What truth does this reflect?

At the simplest level, we think it reflects the inade-

quacy of the studies that have explored these relationships. As a class, they have been overly ambitious. They have tried to show too much. They have traded precision for grandeur. They have oversimplified rather than dug. We find it neither surprising nor damning that the theory has not been supported. The problems of testing these subtle dynamics demand a more humble approach.

One of these problems derives from the fundamental tension between replicable experimentation, which depends on discrete parameters, and architectural design, which deals in rational wholes. We are prepared to believe that a creative designer can accept a fuzzy assignment, such as "design a highly protective environment," and produce a design which enhances security demonstrably. We are even prepared to believe that a number of designers working on this assignment independently will produce designs with certain, common features. At some level of generality, the distinguishing characteristics of this type of intervention no doubt can be described. But we doubt that this description will be simple, unidimensional, or subject to easy quantification. We doubt that it will consist of neat, straightforward rules--e.g., minimize the number of apartments per floor, use small groundfloor windows, etc.--that anyone can apply to any housing project. We think that such "cookbook" specifications would miss the point of the creative designer's contributions--and attenuate the impact of this contribution on the desired result. A demonstration (or study of natural variations) that defines the "independent variable" so simplistically seems *ipso facto* limited to marginal effects.

When the assignment is still fuzzier--i.e., "design an environment that increases people's territorial behavior"--the definition and quantification of the independent variable increases in complexity. None of the studies we reviewed has done this complexity justice. Though the definitions have been intuitively appealing, and even ingenious, they have been

uniformly superficial. We suspect that considerable developmental research on the nature and measurement of the independent variables may be necessary to achieve the degree of precision commensurate with the complexity of the hypothesized links.

The definition and measurement of the dependent variables raise a second, similar problem. Again, the definitions have been glib. As indicators of potent behavioral changes, "number of acquaintances" and the other measures used to date seem diffuse and weak. To do better, it may be necessary to develop detailed rationales of the plausible connections between the physical environment and protective behavioral patterns, and to test these link by link. Insofar as we have been able to determine, such basic, modeling studies have not yet been attempted.

A third problem is that of "boundary conditions." That relationships between environmental characteristics and protective behaviors apply uniformly across all populations and circumstances seems doubtful. Are the responses of residents with modest incomes likely to be the same as those of residents operating at the margin of survival? Are the patterns of interactions among residents with fairly homogeneous characteristics (e.g., with respect to age) likely to be similar to the patterns among heterogeneous groups? The studies to date have assumed that people who live in the same housing complex or neighborhood are sufficiently homogeneous to be treated as a single sample. To the extent that this assumption is not warranted, the relationships that do exist have been understated.

The second and third problems apply equally to Type 3 studies, and raise still another obstacle. This is that factors related to ambiance can plausibly explain only a small portion of the variance in crime rates. Unless the other determinants somehow are equated in a comparative study, the effects of ambience are likely to be swamped.

Controlling extraneous effects does not seem practical. The contexts in which the studies take place--neighborhoods, usually, with all the socioeconomic and demographic complexity that implies--are too resistant to the scientist's available tools. But either of two alternatives to the approach that has been taken would provide a fairer test. One is to validate the effects of ambience initially against intermediate criteria that are likely to be influenced more by resident behavior than by extraneous factors. The amount of information/help provided the police in criminal investigations is an example. The other is to combine interventions directed at ambience with interventions directed at other factors, and test the total package. This was done in Hartford. Either approach would increase substantially the amount of variance that the intervention can be expected to explain.

We do not raise these issues to defend the theory. Saying that the approaches that have been used would not have detected useful relationships does not imply that such relationships exist. Our point is simply that we cannot see the big picture concerning community-building because the hazy studies done to date obscure it. To test the potential of community-building, measures and analytic frameworks more precise than those currently available must be developed. This may require a substantial investment, however, and the returns cannot be predicted.

Policy Implications

The limited evidence on the C/BE link should not constrain the application of these ideas to *new construction*. Most of the design principles the theory suggests are inherently desirable, whether or not crime is reduced. Many also are low-cost or no-cost features, in the case of new construction. Arranging for fewer families per entrance, a minimum of unassigned space, congruent uses of land in adjacent areas, improved maintenance, esthetic appeal, etc., can be justified without

reference to crime. Assuming that the C/BE link is valid would seem to be a fail-safe approach in public housing design.

In the case of existing housing projects and structures, the scant evidence suggests a more cautious approach. The changes can be expensive. Our review indicates an optimistic stance on measures clearly linked to security--hardware, access control, etc.--and a conservative stance on measures tied to hypothetical constructs--territoriality, cohesion, etc. When the latter do seem appropriate, they should be combined with other, more traditional measures, as was done in Hartford.

Research Implications

The premise that motivated this study was that the knowledge base we would develop would consist of a set of facts of varying degrees of hardness, and that the juxtaposition of these facts and the needs of policy and practice would reveal the critical gaps. Had this premise been valid, we would have concluded this report with a list of important research topics. We would have identified specific questions that should be answered to fill the space between related but discontinuous facts.

As the preceding sections indicate, however, the knowledge base that emerged from our survey took a different form. It turned out to be "binodal." On the simpler, most widely held assumptions, it provided incomplete but reasonably persuasive verification. There are unknowns, but not really pressing knowledge gaps. On the more imaginative, exciting propositions, it failed to provide even minimal anchors. In a very real sense, the state of the art on these dynamics is a single, giant gap.

It follows that neither "node" lends itself to a shopping list of important research topics. But both suggest directions, as summarized below.

On the portions of the domain on which the evidence is in substantial agreement (on the "target-hardening" issues and the short-term reduction of fear), we think that further research would have only marginal value. We know enough to prescribe, at least at the extremes. The cost of illuminating the trade-offs in intermediate cases is likely to exceed the practical worth of the increments in knowledge. Proving that sensible practices make a palpable difference can be extremely difficult, as we suggested earlier. We doubt that this portion of the domain affords opportunities for important C/BE research.

In the remaining, obscure portions of the domain (concerned with the surveillance and community-building models), the opportunities are as great as those of any virgin field. They also entail high risk. The scattered, positive signs are offset by the clearcut indication that the linkages are weak rather than robust. Whether further research would yield significant findings, whether these findings would be actionable, whether the actions would make appreciable inroads in crime reduction are matters for conjecture.

To maximize the chances of positive findings, we have suggested a break with the tradition in the field. Large-scale demonstrations cannot be supported by the existing state of the art. Fancy regression models will not compensate for the missing nuts and bolts. The need is for a deliberate, incremental research strategy. Four types of studies seem especially useful, in accordance with our earlier remarks:

1. *Diagnostic Studies.* There is insufficient descriptive data on the micro-dynamics of people's responses to criminal or suspicious activity, and to anti-crime measures. Open ended, observational studies could help to sharpen constructs, models, and measures. The cases in which past research failed to find the expected responses provide any number of useful entry points. Why have increased opportunities for surveillance not demonstrably increased detection,

for instance.

2. *Methodological Studies.* We discussed the problems of measurement at the beginning of this section. They apply not only to outcomes but also to the independent variables. On the nature of the indicators, scaling techniques, units of analysis, etc., the basic developmental work has not as yet been done.

3. *Modeling Studies.* These are the studies we have referred to as Type 2. They test the intervention against (appropriate) intermediate outcomes rather than crime. They confirm hypothesized links. If the link is confirmed (e.g., if interventions that are to reduce crime via "territoriality" do increase the residents' "territorial behavior"), the research proceeds to a test of the related Type 3 link. Does territorial behavior affect the rate of crime? If the hypothesized changes do not occur (i.e., if territorial behavior does not change), it is clear that something is wrong. Testing the interventions' impact on crime is pointless. At the present state of the art, these kinds of modeling studies are likely to be far more cost-effective than the more costly and complex impact assessments. Establishing the boundary conditions on a certain phenomenon (e.g., the population to which it is applicable) also is more efficient with intermediate rather than ultimate criterion measures.

4. *Multi-Strategy Studies.* At a number of points, we have suggested that the appropriate role of environmental design may be as an adjunct to other measures. It seems reasonable to assume that virtually any anti-crime measure can be made easier or harder to implement by the characteristics of the physical environment. It would seem useful to explore this. Using design strategies that reduce fear as an adjunct to resident anti-crime initiatives is one possibility that we suggested. The logical connections between the surveillance rationale and the police response suggest a number of others.

These are options. Whether they should be pursued by relying on spontaneous, independent investigators, or through the sponsorship of Federal funding, is a choice that is not answerable by the data. Subjective perspectives are crucial. People who are not intimately involved in the study of the C/BE link tend to see the current state of knowledge as typical of an initial, exploratory phase. People who are working on other approaches to crime prevention tend to see the current state of knowledge as typical of a fad that has failed to prove itself. Our judgment falls between the two extremes. It is unlikely that subsequent research on the link will reveal simple keys for dramatically reducing crime. But there is a pressing need for further exploration of why people act in ways that are envisioned by the C/BE logic: defense of turf, cooperation with neighbors, informal social controls, etc. In this, C/BE research focuses attention on some critically important criterion variables in crime prevention research.

Appendix A:

Literature Review Strategy and Bibliography

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FOREWORD

The following is the first of a series of Special Reports prepared by the staff of the American Institutes for Research (AIR) as part of the study "Synthesis of Research on Environment." This report has been prepared under Contract J-LEAA-026-78 with the Law Enforcement Assistance Administration (LEAA).

The objectives of this project, as defined by LEAA, include a review and methodological assessment of the empirical studies that investigate the relationship between the physical characteristics of the built environment and crime and crime prevention behaviors. The goals of the project include identifying the strengths and weaknesses of the studies reviewed and the development of a synthesis that summarizes the knowledge in the field.

The first task in the project was to identify and collect a complete inventory of "topic area" studies that were to receive detailed assessment by AIR. This task involved the development of selection criteria, which are discussed in detail in this report. The other tasks of this project will be: (1) to design a classification scheme and classify the topic area studies; (2) to conduct a preliminary assessment of the methodologies used in each study; (3) to prepare a commentary on each study reviewed; (4) to select from the studies reviewed a subset of the studies that appear to be well conceived and methodologically sound and to conduct a detailed assessment of these; and (5) to synthesize the entire crime-environment literature and produce a final report documenting the previous work.

CONTINUED

1 OF 2

INTRODUCTION

The major goal of the first phase of this project was to conduct a comprehensive search for empirical studies that investigate hypothesized relationships between physical characteristics of the built environment, crime, and crime prevention behaviors. The relevant literatures surveyed include fields such as architecture, psychology, criminology, sociology, urban planning, and urban geography.

This report includes a discussion of the selection criteria used to determine if a study merits detailed review and assessment by AIR for this project. The studies selected for such review are referred to in this report as "Tier I" studies. In addition to performing methodological assessments of the empirical studies, AIR will produce a state of the art review of the knowledge of the relationship between crime and the physical environment. While this review will draw primarily on the empirical studies reviewed by AIR, it will also incorporate concepts, theories, and knowledge found in other, nonempirical works. Therefore, the bibliography presented in this report includes studies that will not receive careful review on methodological grounds, but that may be relied upon in the final task--the state of the art review. These studies are referred to as "Tier II" and "Tier III" studies.

In addition to discussing the selection criteria, this report outlines the approaches used to search the literature, the bibliography of topic area and related studies, and the names of persons successfully contacted as part of the literature search.

Selection Criteria for Topic Area Studies

The key criterion used in selecting topic area studies for subsequent review ("Tier I" studies) was whether a study was an *empirical investigation* of the relationship between the *physical characteristics* of the built environment and crime or crime prevention behaviors. Studies exclusively investigating the relationship between the *social environment* and crime-related behaviors were therefore excluded from a Tier I classification.

Further, it was decided that all studies selected for further evaluation must investigate the *effect of the physical environment on human behavior or human perceptions* (i.e., fear of crime). This would include investigations of such physical elements as lighting, locks, landscaping, or alarm systems, and their effect on actual or potential offenders, victims, or bystanders. Target hardening studies focusing on the types of force, weapons, or techniques necessary to defeat a particular type of lock, window, door, or alarm system were considered inappropriate for further review.

Studies selected include a variety of empirical research methodologies. Most of the studies employ quantitative analytic methods (e.g., analysis of variance, correlation, multiple regression techniques, etc.). In addition, non-quantitative studies that used mapping techniques were included among the "Tier I" studies.

Another criterion used in selecting studies for future review was the *type of environment* analyzed. The various bibliographic searches included studies of residential areas, shopping districts, recreational areas, schools and school

grounds, public buildings, transportation facilities, and other urban and rural environments. Types of environment excluded from further consideration were those with idiosyncratic characteristics and overriding security needs: i.e., prisons, mental hospitals, army bases, and other "total" institutions, nuclear test sites, banks, and other such environments with unique security requirements and physical characteristics.

A final criterion used in selection of "Tier I" studies was the *type of crime* analyzed. Included are studies that focus on crimes against property (e.g., burglary, vandalism, and shoplifting), and crimes against persons (e.g., murder, assault, rape, robbery, and purse snatching). White collar crime was excluded.

After applying these criteria to a broad range of crime-environment studies, two major types of empirical studies have emerged. The first type investigates how the physical environment directly intervenes between the offender and potential target or victim. Studies that investigate the deterrent effects of target hardening fit into this category. The other group includes those that investigate the manner in which physical characteristics of the built environment serve as a moderating element indirectly affecting the actual or potential offender or victim. Studies that investigate the relationship between surveillance and crime-related behavior fit into this category, because they purport to investigate the offender's perceived sense of risk or the potential victim's perception of control. The majority of studies selected for future consideration treat physical characteristics as moderating elements rather than as elements that directly intervene between the offender and potential victim.

Tier II and Tier III Studies

In addition, the crime-environment literature is composed of a wide variety of theory papers, nonempirical research efforts, planning documents, "security analysis" studies, and other efforts that are intrinsically related to the subset of empirical studies defined above.

These studies fall into two general classes. One group, which we refer to as "Tier II" studies, included empirical studies investigating crime-social environment relationships. These studies do not address the physical environment to a sufficient extent to warrant inclusion in the core literature. Studies in this group include empirical studies generally found under such headings as "man-environment relation," and social-psychological and social relations" and cover such topics as citizen participation, crowding, sense of community, etc., and their effects on crime-related behaviors.

The final group of studies, "Tier III" studies, consists of theoretical or nonempirical works on the crime-physical environment relationship. These studies include the theoretical works and planning documents of Jacobs, Wood, Gardiner, Newman, Brill, and others, and are an important source of the concepts and theories underlying the empirical research in this field.

Approaches Used in Literature Search

Empirical crime-environmental studies arise from numerous disciplines, including architecture, psychology, criminology, sociology, and urban planning. In addition to the many

published studies, there exists a substantial amount of unpublished material that deserves careful review. In order to develop a comprehensive list of topic area studies, a variety of approaches were used in our literature search.

One primary search method included the use of a variety of computer and manual searches of relevant journals, indices, bibliographices, conference proceedings, etc. As books and articles were collected, each of their bibliographies were searched for further references. Any reference that suggested that it might meet the "Tier I" criteria was then collected.

The second method used to identify "Tier I" studies included a telephone survey of approximately 130 of the leading researchers and Federal, state, and local officials with experience in the crime-environment area. We originally called a list of 50 to 60 persons whose writings, attendance at conferences, and other past achievements and efforts made them obvious choices for contact. During each phone interview, we described the scope of our study and asked our contact if he or she had conducted research in this area. In addition, we asked the person to nominate other studies for inclusion and to suggest names of other individuals to contact. This process led to the development of a substantial list of key persons who were successfully interviewed between November 1978 and January 1979.

Below, we list the library and computer searches, bibliographies, indices, journals, conference proceedings, and other sources searched by AIR. The list of phone contacts is also included below.

Library and Computer Searches

In conducting the computer and manual searches, we focused on titles that dealt with:

- Crime/Environment Factors
- Environmental Design
- Architectural Design for Crime Prevention
- Defensible Space
- Territoriality and Crime Prevention
- Transportation Patterns and Crime
- Spatial Configuration of Criminal Victimization
- Target Hardening

The computer-assisted searches undertaken included:

- National Criminal Justice Reference Services
- PROFILE/LEAA
- National Technical Information Service
- Smithsonian Social Science Information Exchange
- Datrix-University Microfilms (Dissertation Abstracts)
- National Institutes for Mental Health
- Department of Housing and Urban Development

Bibliographies

The manual searches were conducted using the following bibliographies, indices, journals, and conference proceedings as starting places:

- American Institutes for Research--"Crime and Public Housing," October 1978. Annotated Bibliography.
- Northwestern University--"Reactions to Crime Project: An annotated bibliography." July 1976.
- Rand Corporation--"Designing Safe Environments," May 1978.
- U.S. Department of Housing and Urban Development--"Defensible Space and Security: A partially annotated bibliography." November 1976.
- Westinghouse National Issues Center--CPTED Project 1977. Annotated Bibliography.
- Whyte, A. B. "Physical Design and Urban Crime: A selected bibliography." November 1976.

Indices

- Avery Index to Architectural Periodicals
- Art Index
- Psychological Abstracts
- Sociological Abstracts

Journals

- American Behavioral Scientist
- American Institute of Architects Journal
- Criminologica
- Criminology
- Design and Environment
- Ekistics
- Environment and Behavior
- Journal of Criminal Justice

- Journal of Criminal Law, Criminology and Police Science
- Journal of Housing
- Journal of Research in Crime and Delinquency
- Journal of the American Institute of Planners
- Urban Design
- Urban Studies

Conference Proceedings

- American Criminological Society
- American Sociological Association
- American Psychological Association
- Environmental Design Research Association

Summary

The methods used in the literature search yielded a broad range of published and unpublished studies, investigating the crime-environment relationship.

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